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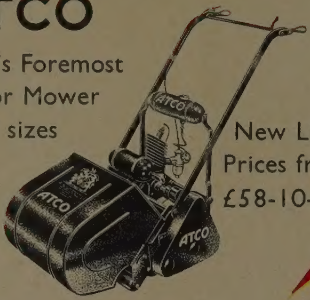

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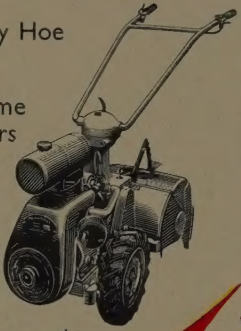

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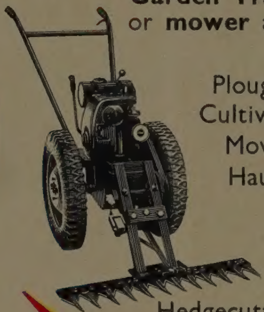

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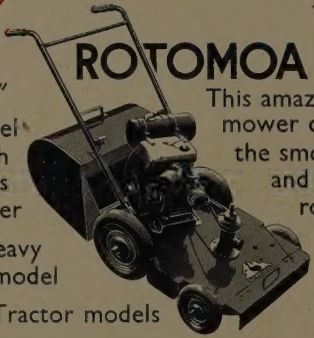

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Volume 90
Number 1
15 January
1955
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NEW ZEALAND JOURNAL OF Agriculture

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Direction
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Rt. Hon. K. J. Holyoake,
Minister of Agriculture

This Month's Cover

A worker in a tobacco field at Riwaka in the Nelson district is the subject of this month's cover, which has been reproduced from a colour photograph by E. W. Were. The whole of New Zealand's tobacco crop is grown in the Nelson district and at this time of year several hundred seasonal workers start moving into the area to assist with the harvesting of the crop, of which about 3000 acres is grown. Total production in the 1953-54 season was 4,212,311lb. Picking lasts from about mid-January to April, but numbers of workers stay on until July to help with grading.

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EXPORTS OF THE ISLAND TERRITORIES

HEADING PHOTOGRAPH: Preparing ground for new plantings in a citrus nursery in Rarotonga. National Publicity Studios photo.

Developing Agriculture in New Zealand's Island Territories

BECAUSE of the need to develop agriculture in New Zealand's island territories the Government decided early in 1952 to establish a Tropical Section in the New Zealand Department of Agriculture so that advice on all agricultural problems could be given to the local Administration and Departments of Agriculture in the islands. As this section can draw on all the New Zealand agricultural research stations and experts for specialist advice, the island territories can now benefit from the results of scientific research work which would otherwise be beyond their financial resources. In this article J. C. Gerlach, Agronomist, Tropical Section, Department of Agriculture, who is attached to the Department's Rukuhia Soil Research Station, discusses the pattern of agriculture followed in the territories and the difficulties which have to be overcome in expanding production there.

THE average New Zealander may not realise that the boundary of his country extends from the North Island for about 2500 miles in a north-eastern direction and that the Dominion has administration of territory as far south as the South Pole. New Zealand's tropical territories are situated between the Tropic of Capricorn and the Equator, the nearest to the mainland being Niue Island. Further north is Western Samoa and beyond that are the coral-built Tokelau Islands; more to the east are the Cook Islands. Fiji does not belong to New Zealand, but is a British Crown Colony administered by the Colonial Office in London, and Tonga is a kingdom under British protectorate.

Illustrations opposite: Top left—A Western Samoan banana plantation. Top right—A cacao tree in pod in Western Samoa. The pulp-covered seeds are visible in the opened pod on the left. Upper middle—Halved coconuts for sun-dried copra manufacture in Rarotonga. Lower middle left—A hat being plaited from strips of pandanus leaves on Niue Island. Lower middle right—A 7-year-old orange orchard established in the Citrus Replanting Scheme at Aitutaki, Cook Islands. Bottom left—Banana inspection on the wharf at Apia, Western Samoa. Every case is opened before shipment. Bottom right—Sorting, inspecting, and packing tomatoes in a packing shed in Rarotonga.

Climate

The visitor to the island territories is impressed first with the gorgeous colours of the sea within the reefs surrounding them and the luxuriant growth of the vegetation, but soon notices the marked difference between their climate and New Zealand's. The most striking aspect is probably the temperature.

For example, the mean temperature of the warmest month at Aitutaki is 81 degrees F. and that of the coolest month is 75 degrees F.; at Rarotonga the mean temperature of the warmest month is 79 degrees F. and that of the coolest month is 71 degrees F. Comparable figures for Auckland are 63 degrees F. for the warmest month and 49 degrees F. for the coldest month, and at Ophir, Central Otago, they are 60 degrees F. and 34 degrees F. respectively.

Another characteristic is that there are only two seasons—the wet and the dry. The latter coincides with the New Zealand winter and is therefore the best travelling season. Total rainfall differs slightly, though some heavy downpours during the wet season may be expected in the islands. The amount of sunshine exceeds that of Nelson and Napier, the two areas in New Zealand renowned for the high numbers of hours of bright sunshine.

With such favourable conditions for plants the lush growth in tropical forests and crops is not surprising, particularly when the soil is sufficiently fertile.

Soils

New Zealand soils are derived from a fairly wide range of parent material, but the soils in the island territories are products of basalts or coral limestone or a combination of the two. Another difference is that in a tropical climate the process of weathering is more rapid than in the temperate zone and the torrential downpours make the land more susceptible to erosion than elsewhere.

Some of these volcanic soils are very fertile indeed, yielding heavy crops, but others, like the coral sands, are poor and droughty, so that, for example, on some coral atolls in the Northern Cook Group the people's diet consists mainly of coconuts and fish. Some of the islands, like Upolu and Rarotonga, are dissected by small rivers and creeks, occasionally forming beautiful waterfalls; Niue, however, has no rivers or springs at all. The people there and their crops depend on the rainfall for water supply.

The variations in these two fundamental factors, climate and soil, are the reason for conditions for agriculture in the tropics being quite different from those in New Zealand.

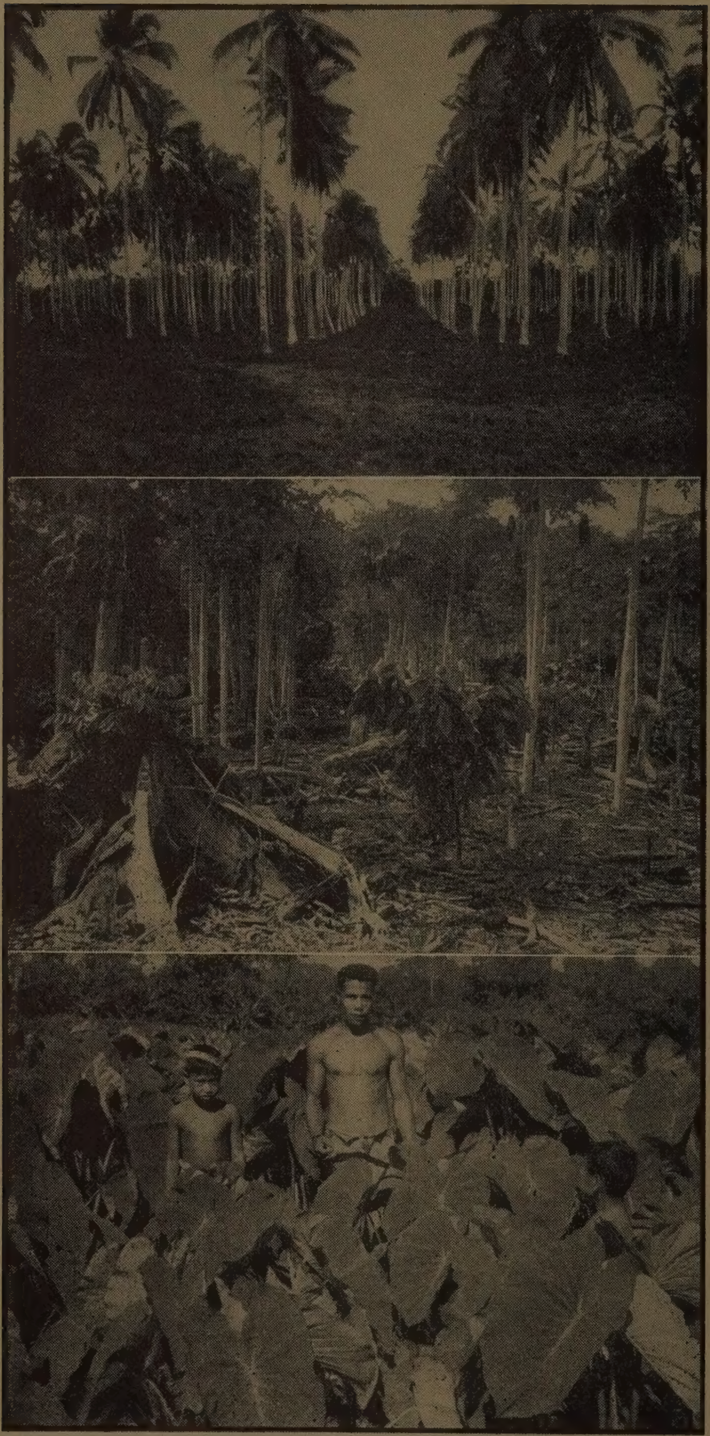
There is another important distinction between the two types of farming. Primary production in New Zealand means animal industry, because of the 20,000,000 acres in cultivation 18,000,000 are in grassland and less than 1 per cent. of the occupied land is in crops, orchards, and vegetables. In the island territories most of the cultivated land is in food and cash crops and the area in pasture is insignificant. Western Samoa has about 10,000 head of cattle, mainly belonging to the New Zealand Reparation Estates and some missions, but most of the people are more interested in pigs and fowls. Their main source of animal proteins is fish, speared within the lagoons or caught in the surrounding waters of the Pacific.

People of the Islands

The third factor influencing agricultural production, as in any country in the world, is the people. About 114,000 of them are living on the various islands in the territories, which cover a total land surface of about 850,000 acres. They can be divided into several main tribes, each with its own dialect and customs, but they are all of Polynesian stock.

Since the first of the island territories came under its protection at the beginning of this century the New Zealand Government has endeavoured to develop these likeable and intelligent people to a stage where they can adjust themselves better to modern economic, commercial, and social conditions and so bring them to a higher level of prosperity. Particularly in the fields of health and education excellent results have been achieved already, but the agriculture has remained in a fairly primitive stage.

From the rapidly increasing requests for advice and assistance it is obvious that there is a great need for expert agricultural advice in the islands to help the people there to reach a stage of technical development equal to that of other countries in the world. As these islands are part of New Zealand, whether as a dependency or as a trusteeship from the United Nations, these people must be helped in their development.



← Plantations in Western Samoa. Upper—Coconut palms in the New Zealand Reparation Estates. Middle—Young cacao trees shaded with pawpaw trees. Lower—A 6-month-old taro plantation.

The problem of economic and agricultural development becomes more urgent still in view of the great increase in the population as a result of improved hygienic conditions and general health in recent decades. In Samoa, for example, the population has increased by about 25 per cent. since the war, so that the present figure will be doubled in 20 years. By that time the production of food must be doubled and the export production more than doubled, because these people will then probably have developed and reached a higher level of requirements.

Is there enough suitable land to extend the plantations sufficiently for the purpose of relieving this increasing pressure of the population on the land?

Will it be possible to achieve this higher production with the present simple system of cultivation?

Agriculture in the islands is interwoven with age-old customary laws and traditions, which, for instance, determine the form of land tenureship. The land is owned on a community basis by the family and not by the individual member, which makes it practically impossible for a young man with initiative to go ahead on his own in land development.

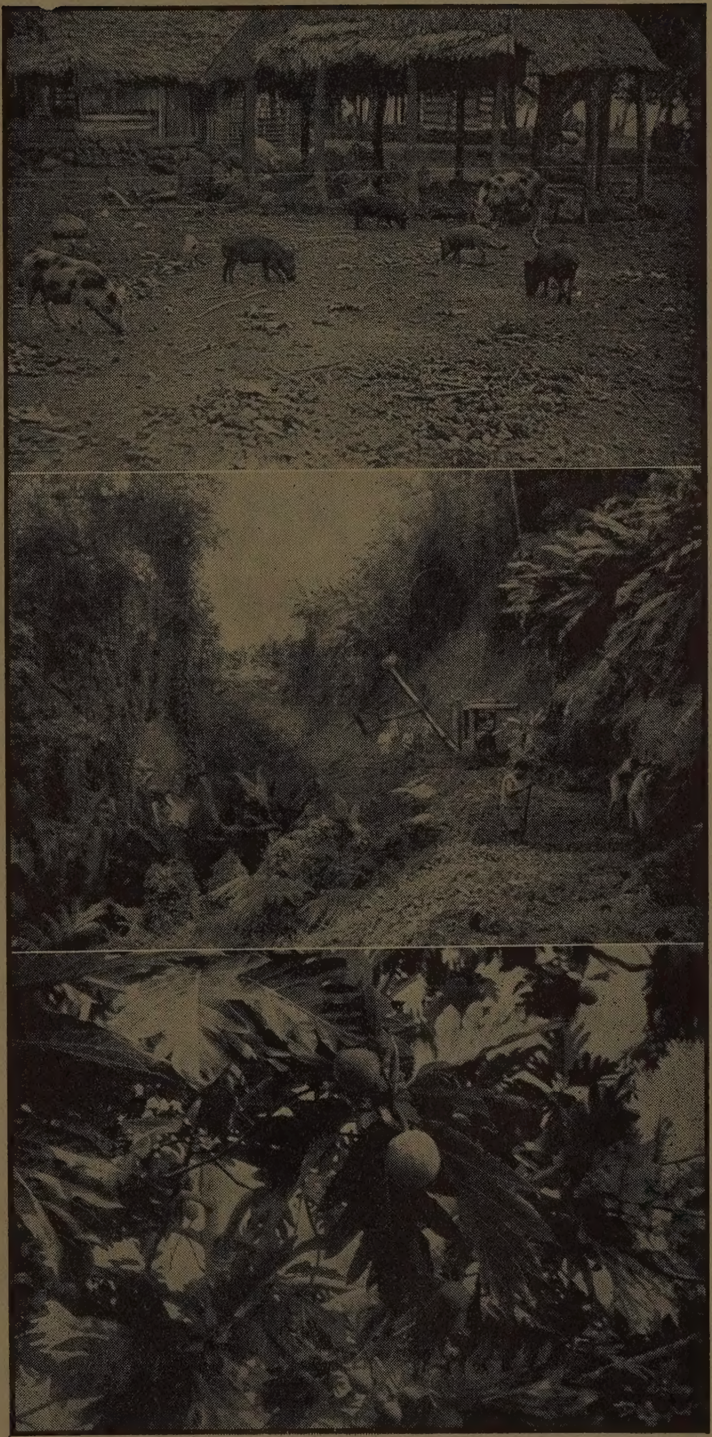
Will not this system of land tenureship form a serious handicap to rapid development of these islands?

These and similar questions indicate the problems to be solved in the endeavour to bring these countries to prosperity, but what do the islanders themselves think about these problems?

Most of these good-natured and cheerful people do not realise that there is any problem at all. They, like most of the indigenous peoples in the tropics, have a different attitude to life from the Europeans. Floods and droughts causing food shortages and lava streams or hurricanes destroying whole villages will be accepted in a fatalistic spirit as a natural factor or as a Heaven-sent affliction. Their attitude toward primary production is also different. As soon as their requirements are fulfilled there is no incentive left for higher achievement. One Samoan explained that as follows:—

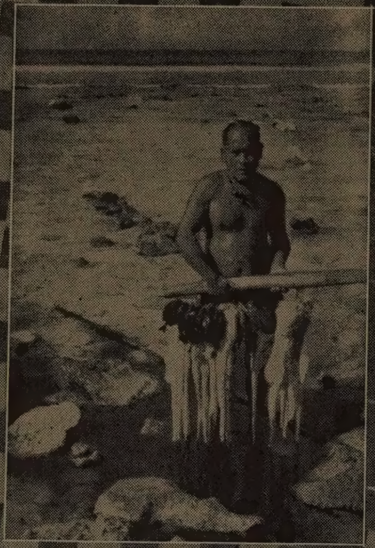
"The good Lord has been very kind to us. We have only to dig a few holes and plant some taro shoots or breadfruit trees and we get a plentiful return. We go out in our canoes and don't even need to go beyond the reef to catch plenty of fish. The forests give us wood for our houses and the bark for our clothes. Why should we bother to get more?"

Left to their own devices these people would remain in a primitive state, an easy prey to any unscrupulous raider exploiting the islanders to his own advantage. In such circumstances the chances of their ever achieving modern techniques which



Upper—Pigs and poultry are important ➡ in village life in Western Samoa, where in 1952 the estimated number of village pigs was 40,000. Middle—Road construction through the jungle in Western Samoa. Lower—Young breadfruit growing in Western Samoa.

LIFE OF THE ISLANDERS



Left—Hill pasture of native grasses, Savai'i, Western Samoa. Right—White-headed Hereford cattle in jungle pasture in Western Samoa. The animals graze on creepers and young shoots.

would enable them to take their rightful place among the nations would be remote.

Agricultural Practices

At present the type of agriculture generally practised is a fairly primitive system of shifting cultivation to grow food. An area of forest is cleared and burnt and holes are dug with a pointed planting stock or iron crowbar to plant the shoots of taro. The staple food of most islanders consists mainly of the starchy roots of taro, yams, and similar plants and green bananas and breadfruit, usually cooked in the native oven of heated stones.

After the crop is harvested the land is abandoned, allowing a regrowth of the bush, and another piece is cleared for the next crop. Fresh ground is thus cleared for each crop, a return being made to the first patch after a certain number of years. As an adult Samoan, for example, requires 6lb. to 8lb. of taro or 8lb. to 10lb. of bananas per day, crops which can be harvested only after 9 months to a year, a fairly extensive area has to be planted to sustain a whole village.

With the increase of population in certain areas the farmers had to go further and further away to find bush old enough for their plantations. The plantations eventually became too far removed from the villages and farmers therefore began to use plots with younger bush, where the soil had not sufficiently regenerated, resulting in lower yields and exhaustion of the soil. This is one of the many problems facing the local Departments of Agriculture, which are leading the way now to improved systems of cultivation in an attempt to ensure adequate food supplies in future for the rapidly increasing population.

Illustrations opposite: Upper left—A catch of fish and octopus speared on the reef at Rarotonga and tied to a floater. Upper right—Samoans preparing the evening meal. Taro roots and breadfruit are peeled before being cooked in the Native oven of hot stones. Middle left—The north coast of Upolu, Western Samoa. Middle right—A drum band, including kerosene tins, at Aitutaki, Cook Islands. Lower left—Schoolgirls in a song and dance performance at Arawea School, Aitutaki. Lower right—Samoan fales (huts) built on foundations of rocks. Screens of plaited coconut leaves around the buildings can be lowered as shelter against rain and strong winds.

A more advanced system of food cultivation in some islands of the Lower Cook Group should be mentioned. The Maoris there make a distinction between swamp taro and dry land taro. The former is planted in well-prepared beds in the swamps close to the coast or in flooded terraces in the valleys. This irrigation system was generally applied by the Maoris in former years, but has unfortunately gone out of use in some areas.

Cash Crops

Of the cash crops yielding exportable products the most important are coconuts, cacao, citrus fruit kumaras, tomatoes, and bananas. There are several other articles, such as coffee, rubber, pineapples, mangoes, pawpaws, nutmeg, plaited ware, and pearl shell, which are exported to New Zealand and other countries, but the first group contains the bulk of the produce, having a total value of over £2,000,000 a year.

The coconut palm, which is widespread in the islands, is doubtless the most important tree to the islanders. Its products are not only used for food and drink, fish-bait, thatch, hats, and numerous other purposes, but it provides a valuable export product—copra. Part of the copra export is going to New Zealand, but the bulk is purchased by the British Ministry of Food at yearly fixed prices.

Most trees and plantations are in the coastal areas in and around the villages, though the palms are spread over the whole of each of the smaller atolls and coral islands, which, with the exception of Niue, are normally only a few feet above sea level. The trees show a great variation in type and production. The planters will be advised now on seed nut selection and proper care of the plantations, which will result in a considerable increase in production in future.

Western Samoa is handicapped in its production by the depredations of the notorious rhinoceros beetle. This insect, which can attain a length of up to 2in., eats its way through the bases of the young fronds in the top of the coconut palm, not only damaging the leaves but occasionally eating through the growing point and killing the tree. Recently it was found in Fiji. As it occurs also in Vavau (north

A young coconut palm in Western Samoa fatally damaged by the rhinoceros beetle.

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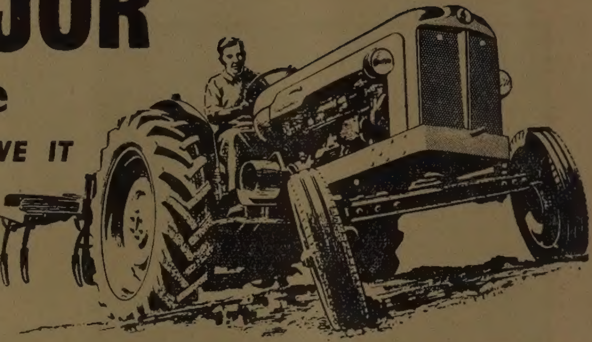

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Tonga) and other islands in the Pacific, strict quarantine measures are applied to prevent introduction of this pest into the island territories which are still free. All attempts to eradicate the beetle have failed and the South Pacific Commission has therefore now appointed a team of three experts to investigate the possibilities of chemical and biological means of combating the insect.

The cacao is restricted to Western Samoa, which has the best conditions for this crop, grown in European and to an increasing extent in Native plantations. About 3000 tons of cocoa beans are exported annually at a value of over £800,000. The prices this year soared as soon as the estimates indicated a shortage in world production. This shortage is caused by the swollen shoot disease devastating the plantations in Africa, where the bulk of the world supply of cocoa is produced. As no satisfactory means of combating this virus disease has been devised yet and most of the new isolated plantations have not come into full production, it is likely that these high prices will be maintained for a few years.

The Samoan cocoa is of a quality particularly suitable for blending to improve the flavour. Mr. D. R. Eden, the General Manager of the New Zealand Reparation Estates, discovered a very high-producing tree in the plantations of the estates a few years ago. This tree, by now the world-famous Lafi 7, was highly resistant and perhaps even immune to the black pod disease, a fungous disease widespread in Samoa. Obviously it was worth propagating this highly valuable tree. As it is a hybrid, propagation by seed was useless and the cacao tree is always difficult to propagate by cuttings. On the advice of the Tropical Section, a specialist of the New Zealand Department of Agriculture was sent to Samoa and successfully carried out some experiments on vegetative propagation on a commercial scale with the aid of plant hormones and special application of moisture and shade.

In the meantime the search for other high-producing and disease-resistant specimens is going on to improve the production of the plantations.

Trade of the Island Territories

THE values of imports and exports of the island territories between 1945 and 1953 were as follows:—

Year		Western Samoa Imports	Western Samoa Exports	Cook Islands Imports	Cook Islands Exports	Niue Imports	Niue Exports	Total trade
		£	£	£	£	£	£	£
1945	..	398,760	636,300	144,070	106,246	26,972	29,468	1,341,816
1946	..	478,695	719,050	195,596	108,262	46,677	35,873	1,584,153
1947	..	923,773	1,351,770	253,243	158,525	58,796	45,591	2,791,698
1948	..	962,028	1,108,258	299,849	155,098	69,508	46,769	2,641,510
1949	..	881,584	1,344,758	315,537	214,020	76,761	52,052	2,884,712
1950	..	1,095,121	1,303,761	473,093	228,759	69,937	50,137	3,220,808
1951	..	1,194,698	1,721,942	437,396	314,628	83,447	55,555	3,807,666
1952	..	1,687,790	1,778,084	592,415	365,399	102,595	82,971	4,609,254
1953	..	1,312,769	1,954,689	552,019	351,542	116,852	72,685	4,360,556

The Tokelau Islands have an insignificant trade. The exports consist of copra only, valued at between £5000 and about £9000 a year.

The notable increase in the trade values shows the favourable trend in economic development of the islands. Western Samoa, however, is the only territory with a favourable visible trade balance. The tables below show the strong economic ties between the island territories and New Zealand as their mother country.

IMPORTS AND EXPORTS IN 1953, SHOWING COUNTRIES OF ORIGIN AND DESTINATION

Country	Western Samoa Imports	Western Samoa Exports	Cook Islands Imports	Cook Islands Exports	Niue Imports	Niue Exports
	£	£	£	£	£	£
New Zealand	411,942	451,314	433,647	304,324	97,653	68,857
Australia	235,195	78,284	11,485	1,391	2,384	3,721
United Kingdom ..	323,596	1,044,253	60,584	1,003	2,586	—
Canada	45,169	70	21,966	—	—	—
Fiji	62,138	579	—	—	13,245	—
India	33,352	—	—	—	—	—
U.S.A.	55,790	374,929	13,372	39,090	29	—
Others	145,587	5,260	10,965	5,734	955	107
Totals	1,312,769	1,954,689	552,019	351,542	116,852	72,685

QUANTITIES AND VALUES OF PRINCIPAL EXPORT ITEMS IN 1953

Item	Western Samoa Quantity	Western Samoa Value	Cook Islands Quantity	Cook Islands Value	Niue Quantity	Niue Value	Tokelau Islands Quantity	Tokelau Islands Value
		£		£		£		£
Copra (tons) ..	11,185	732,792	1,094	74,276	601	41,066	280	9,255
Cocoa (tons) ..	3,743	930,892	—	—	—	—	—	—
Bananas (cases) ..	252,582	262,348	—	—	3,325	2,858	—	—
Citrus fruit (cases)	—	—	38,616	49,808	—	—	—	—
Tomatoes (boxes) ..	—	—	98,957	77,469	—	—	—	—
Pineapples (cases) .	—	—	30,621	25,393	—	—	—	—
Kumaras (bags) ..	—	—	—	—	19,192	17,740	—	—
Plaited ware ..	—	—	—	—	—	7,163	—	—
Pearl shell (tons) .	—	—	309	71,747	—	—	—	—

Pandanus plants, the leaves of which are used for making plaited ware in Niue Island. The leaves are tied together to avoid their being bruised.

Cook Islands' Dependence on Citrus

The Cook Islands are the source of the well-known delicious Island oranges, mandarins, and tomatoes. These Island oranges, which are sold in New Zealand from May to August, sometimes have a typical rust-brown appearance. This is caused by the citrus rustmite, which affects the skin, giving it a less attractive appearance, though there is no detrimental effect on the quality of the fruit.

In the orchards established in more recent years under the Citrus Replanting Scheme to assist the local industry the trees are sprayed regularly, which reduces the effect of the rustmite considerably. However, the old plantations and odd trees in the bush still form an excellent breeding ground for the insect. Therefore it was decided to try a biological control and the Department of Island Territories has made arrangements in co-operation with the Entomological Research Station, Department of Scientific and Industrial Research, Nelson, for the introduction of a predator of this rustmite from California. A Senior Entomologist from Nelson visited the Cook Islands last year to investigate also other pests and to advise on methods of eradication.

The citrus industry has always been a very important economic factor in the lives of the Cook Islanders and the Administration has done everything to develop it. At present over 400 acres are planted out under the supervision of the local Department of Agriculture with carefully selected varieties of oranges and mandarins, which are regularly cultivated and sprayed. The Citrus Replanting Scheme will be extended up to 850 acres within the next 3 years. The land is by family agreement vested in individual owners for whom the orchards are established by trained teams of the local Department of Agriculture, who also look after the plots during their early periods of growth. Repayment of the money advanced in this way is made by deduction from the proceeds of the crops when the trees come into bearing, so that at the finish the farmer will own a well-established, healthy orchard in full bearing, which needs only some maintenance to give him ample returns.

Other citrus products such as grapefruit and limes are exported in small quantities from Samoa and Niue Island respectively. The latter island supplies New Zealand also with excellent kumaras (sweet potatoes) in winter, when potatoes are in shorter supply than usual.

Quality of Bananas

Western Samoa and Niue provide New Zealand with bananas, additional supplies coming from Fiji and Tonga. The quality of the fruit as it is sold in the retail shops in New Zealand is often not satisfactory, especially when it is compared with that of bananas sold in England and Europe, which are imported in bunches from the West Indies, a country more remote from its market than the island territories. The bananas arrive in New Zealand fully grown but green and packed as singles in crates which are distributed throughout the country. If the fruit is not ripened off properly by retailers, the quality and flavour deteriorate. Because of the great demand for this fruit the Tropical Section started to investigate this problem last year. With the co-operation of the authorities concerned the Section will make experiments to find out along which lines improvements are possible.

Visitors to the islands are usually delighted to see the beautiful handicraft made of wood and pandanus and coconut leaves. Those who had an opportunity to visit the agricultural winter shows in Hamilton and New Plymouth last year may have seen some of these bags, mats, hats, belts, and other articles, together with various agricultural products from the territories, displayed at the Tropical Stand of the Department of Agriculture.

Old orange trees infested with pests and diseases in Aitutaki.

Agricultural Education

This outline of agriculture in the tropics indicates how much the territories lag behind New Zealand. The local Departments of Agriculture are faced with the difficult task of providing advice and service to farmers who have not had any elementary agricultural training except the knowledge handed on from father to son and the experience they have gained in their lifetime.

As these islands depend so much on agriculture for their existence, for a harmonious development agricultural training is urgently needed. Proposals to introduce vocational training in agriculture similar to the New Zealand system, but adapted to the local conditions, were made recently and are now under consideration by the various Departments concerned.

The islands may be only mere dots in the immensity of the 68,000,000 square miles of the Pacific Ocean and inhabited by only a handful of people, but they are part of the Dominion and their people depend on the people of New Zealand to help them in their development, to encourage them in their attempts to adjust themselves to modern social and economic conditions, and to assist them on their way to prosperity.

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Meteorological Records for November

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	62.3	+ 3.2	78.9	45.3	1.99	11	− 1.85	1.02	17	193.8
Auckland	160	63.8	+ 3.4	77.9	51.8	1.39	11	− 1.91	0.73	25	198.3
Tauranga	10	62.4	+ 3.6	80.2	43.6	1.86	11	− 1.58	0.87	17	225.3
Ruakura	131	60.2	+ 2.8	77.7	38.5	2.52	11	− 1.16	0.75	25	175.4
Rotorua	975	60.1	+ 3.3	80.6	41.0	1.50	9	− 2.48	0.40	17	201.7
Gisborne	12	62.2	+ 3.2	87.8	38.8	2.22	11	− 0.37	0.69	19	202.7
New Plymouth	160	59.9	+ 3.1	69.2	47.5	3.25	12	− 1.46	0.81	7	173.5
Karioi	2125	56.0	+ 4.1	74.9	39.5	4.82	12	+ 0.96	0.94	25	
Napier	5	63.2	+ 3.6	88.7	47.1	1.67	10	− 0.42	0.82	18	194.7
Wanganui	72	61.3	+ 3.1	77.2	48.2	2.56	15	− 0.06	0.81	17	187.1
Palmerston North	110	60.0	+ 3.1	75.5	44.8	2.48	20	− 0.38	0.43	7	128.7
Waingawa	340	59.8	+ 3.7	80.5	38.0	2.49	14	− 0.21	1.30	18	207.9
Wellington	415	57.2	+ 1.4	69.0	43.6	3.71	17	+ 0.34	1.21	25	133.0
Nelson airfield	5	58.8	+ 3.3	80.2	40.7	2.35	11	− 0.38	0.98	25	182.1
Blenheim	12	61.4	+ 4.5	84.0	34.5	1.32	8	− 0.39	0.59	25	217.5
Hokitika	15	56.5	+ 2.8	68.0	40.0	13.94	22	+ 4.01	3.50	6	153.0
Hanmer	1270	57.8	+ 4.0	82.0	33.0	3.33	9	− 0.15	1.29	18	197.6
Christchurch	22	60.2	+ 3.9	84.0	37.8	1.05	10	− 0.77	0.32	7	164.9
Ashburton	323	62.0	+ 6.3	89.8	35.4	1.80	9	− 0.65	0.72	25	172.9
Timaru	56	60.1	+ 4.6	88.8	43.1	2.40	11	+ 0.45	1.19	17	168.3
Alexandra	520	60.6	+ 4.2	87.8	34.8	0.67	7	− 0.41	0.19	17	189.6
Taieri	80	58.3	+ 4.9	87.5	33.4	2.64	13	+ 0.36	1.08	17	162.9
Invercargill airfield	0	56.0	+ 4.2	78.8	29.8	1.88	15	− 1.76	0.41	27	174.3

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during February as follows:—

3YA Christchurch (12.20 p.m.)

14 February—"Grading Meat for Local Consumption", by L. J. Wilson, Christchurch Abattoir.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8.5 p.m., Wednesdays at 8.1 p.m. (Northland stock market report), Fridays at 8.1 p.m.

1YA Auckland, Mondays, Tuesdays, Wednesdays, Thursdays, Fridays, 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawkes Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawkes Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

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Fowlhouse for Eight Laying Birds and Replacement Stock

THOSE interested in keeping a limited number of poultry to obtain fresh eggs for the family's needs are specially catered for in this series of articles by H. H. Watson, Poultry Instructor, Department of Agriculture, Wellington. There are thousands of new homes being built annually and many new owners are mapping out the best way to utilise their sections. Keeping of poultry will be included in the plan in many cases and this month's article describes the building of a fowlhouse to accommodate eight laying birds and replacement stock.

PROVIDED that the birds are from a good laying strain and have good housing, feeding, and management, eight matured pullets could be expected to produce eggs as follows during their laying season:—

Month	Eggs	Month	Eggs
March	48	Sept.	160
April	56	October	152
May	64	Nov.	136
June	80	Dec.	120
July	96	Jan.	100
August	120	Feb.	72

During the season the eight birds would give approximately 1200 eggs or an average of 24 eggs per week. Production could be higher or lower, depending on the breed of bird, strain within the breed, and the time that the birds were hatched. Therefore, these production figures should be accepted as an average. Though the returns appear to be satisfactory, they are little or no guide to the potentialities of commercial poultry farming.

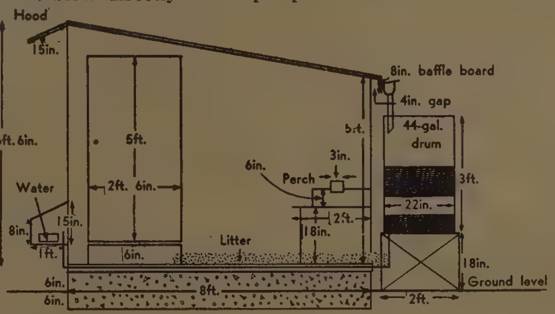
Before a fowlhouse is built it is necessary for the owner of a property to approach the local borough or city council authority and investigate the by-laws governing the conditions under which poultry may be kept. Usually there is a minimum distance at which poultry houses may be built from boundaries and dwellings.

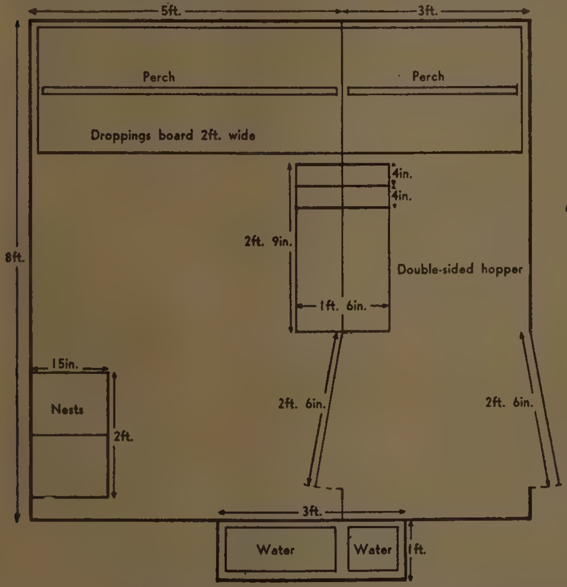
The registration of adult birds under the Poultry Runs Registration Act does not apply to owners who keep 25 or fewer laying birds.

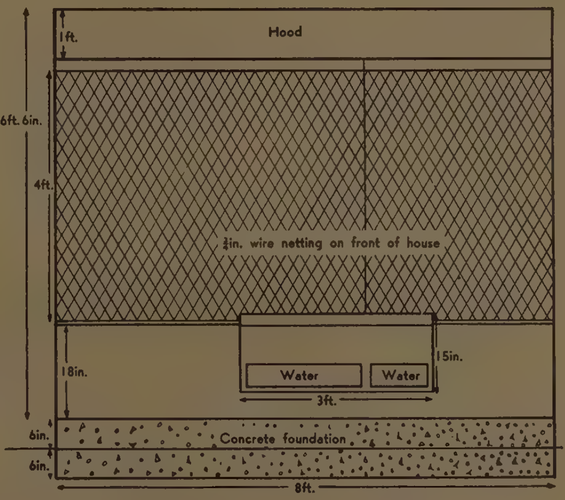
After the by-laws have been investigated a site should be selected. Factors such as size, shape, and elevation of a section will influence the decision. The site should be dry and clear of such features as tall trees and buildings, which can provide overhead shade. This is undesirable during winter, when conditions can be wet and unpleasant. Owners of elevated sections may have to excavate to obtain a reasonably level piece of ground, as high foundations add to building costs.

The front of a fowlhouse should face in a northerly direction, thus gaining the maximum sunlight. This assists in keeping conditions dry and warm in the house. Should the section be exposed to prevailing northerly winds, the house should be built facing in an easterly or westerly direction so that the main blast does not blow directly into the house. If it is not practical to have the house facing north, preference should be given to an easterly direction, as the sunlight would enter early during the morning and assist in warming the interior of the building. The fowlhouse should be built of materials that will ensure that it is comfortable and dry, even during bad weather. Dry conditions in a fowlhouse assist in checking disease organisms. Provided that sufficient floor space per bird is provided in a fowlhouse, there is no necessity for an outside run. Birds respond better in health and production when housed under good intensive conditions than when they are housed in confined conditions with an outside run. An outside run takes up valuable space in an average-sized section, can be unsightly, and under normal conditions becomes dirty and foul, thus increasing the risk of disease. Small groups of birds housed under intensive conditions require from 5 to 6 sq. ft. of floor space per bird. The house should be of sufficient height to allow unrestricted movement for the owner or his family. Ventilation is important, as it supplies the birds with fresh air and also carries away exhaled air and fumes from the droppings. Draughts should be avoided, as they can be harmful and may lead to colds among the birds.

Provision in building a small fowlhouse should be made for subdivision so that young replacement stock can be kept apart from the adult birds. If







Plan (above), end view (upper right), and front view (lower right) for poultry house described.

this is not done, the older birds will bully the younger birds, particularly at feeding, and consequently the growth of the young birds will be retarded. About a third of the house should be divided and this can be done by fitting a partition when the building is constructed. A solid partition should extend 18in. from floor level and the gap to the rafter should be filled in with 2in. wire netting. A door is necessary between the two sections. The main fittings in fowlhouses are perches, nests, troughs, hoppers, water containers, litter, and a brooding coop when heavy breeds are kept.

Foundation and Floors

Preference should be given to a concrete foundation and floor. The floor should be at least 4in. above ground level. A raised floor reduces the risk of moisture seeping underneath and causing dampness. Concrete house foundations should be a minimum of 4in. in width and 12in. in depth, allowing 6in. to be above ground level. The floor should have a 2in. layer of fine concrete and underneath the floor there should be a layer of broken rubble, rocks, bricks, etc. This prevents moisture from rising to the surface of the raised floor. A smooth finish on the surface of the floor will make it easier to clean; this can be obtained by finishing off with a rich mixture of fine concrete and trowelling it carefully.

Wood is the second choice of foundation. Blocks or piles are necessary and should be placed well into the ground. The bottom plates should then be laid and later covered with a wooden floor. The floor should be at least 8in. above ground level for air to circulate freely and prevent dampness. A well-raised floor reduces the risk of vermin such as rats and makes it possible to eradicate them. The timber for wooden floors must be well seasoned and the boards clamped tightly together as the floor is laid.

An earth floor is not recommended, as it is difficult to clean, especially after an outbreak of disease among the birds. This type of floor encourages vermin such as rats and mice.

House for 8 Laying Birds and Replacement Stock

To hold 8 laying birds and replacement stock a building should have a floor space of 8ft. x 8ft., with a 6ft. 6in. stud in front and 5ft. stud at the rear. The roof can be a sloping lean-to type with the rafters extending 4in. out from the rear. An 8in. board is attached to the outside of the rafters and assists in baffling the air that enters through the 4in. gap and so provides ventilation.

Building Materials

The choice of building materials will depend on materials available in a particular district and their cost. Suitable wall coverings are wood and asbestos. Outsides of wooden walls can be painted to match the colour scheme of a home, or the walls may be painted with creosote, which acts as a wood preservative. The interior walls should be of a light colour; white washing is strongly recommended as birds respond to lightness within a house.

Asbestos sheets make an excellent wall covering for a house, as they are easy to fit and hygienic. As the sheets are light in colour, there is no necessity for painting, and maintenance is low. Asbestos sheets tend to be brittle and care should be exercised when handling them.

For roofing materials there is the choice of corrugated iron, corrugated asbestos, or roofing felt. It is advisable to sark underneath corrugated iron, as this prevents radiation of heat and assists to keep out the cold during winter. A corrugated asbestos roof is very satisfactory and being heavier than corrugated iron, it is necessary to ensure that the rafters are strong enough to support it. Sarking is not necessary when asbestos cement sheeting is fitted.

Roofing felt can be troublesome, as this material has to be well nailed to sarking, and owing to the insufficient slope on a fowlhouse roof leaks tend to develop and in windy areas the felt may tear.

Internal Fittings

Perches: These should be made of 8in. x 2in. dressed timber placed on edge with the two top edges bevelled to assist the birds to grip the wood when they are perching. The perches should be placed about 2ft. above floor level. When droppings boards are fitted the perches should be at least 6in. above the boards to allow sufficient room for removing the droppings with a hoe or a small shovel. The perches should not be made a permanent fixture, as red mite can lodge under them if they are fixed to other wood. They may be suspended from the rafters with two pieces of No. 8 wire. Another method is with L angle-iron brackets, with one end resting on the floor or droppings board, and the other end attached to the rear wall. A slot sawn on the under side of the perch allows it to rest on the bracket and at any time a check can be made for red mite. The ends of the perches should also be clear of the end walls or partitions. Adult birds require 6in. to 7in. of perching space for light breeds and from 8in. to 10in. for heavy breeds.

Nests and broody coop: A nest box can be fitted on to one of the end walls and two nests are sufficient for 8 laying birds. The nests may be in two divisions with an over-all length of 24in. and 15in. in depth and 15in. in height. A 6in. board along the front of the nest is of sufficient height to keep the nesting litter in position. Straw, hay, or wood shavings make suitable nesting litter and a good depth of material should be kept in the nests, thus reducing the breakages of eggs. If wood shavings are used, those from pinus should be avoided, as they have a strong smell and can taint eggs.

A broody coop can be made of wire netting and fitted above the top of the nest. A small door in the coop will allow birds to be placed into it after they become broody.

Troughs and hoppers: Birds can be fed with dry or moist mash. A V-shaped trough 3ft. in length with sides of 4in. boards held together by end boards are suitable for the feeding of moist mash or greenfeed. A dry mash hopper can be built into the partition of the fowlhouse. There can be two small sections at the end of this hopper; one for feeding free-choice meat meal, and the other for a calcium grit (oyster or pipi shell).

Birds require adequate fresh clean water and a suitable container for holding daily requirements should be provided. Birds can drink up to a pint per bird daily. An external water trough is recommended and the birds reach their heads through slats in the wall in order to drink. Slats also are placed underneath the water trough so that any drips or dampness can drain out of the house. A cover should be provided over the trough to keep sun and frost off the water. A hinged lid on this cover allows removal of the trough for cleaning. Provision can be made for a 44-gallon drum to be fitted on a stand at the rear of the house and a pipe can be laid from the drum to the water trough.

A litter of 4in. to 6in. in depth within the house provides scratching and warmth for the birds. When the birds are first housed, a little litter only is required, and after this is broken up further litter should be added until a depth of 4in. to 6in. has been built up. Wheat straw and wood shavings make ideal litter material.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during November and for the 4 months ended 30 November 1954, with comparative figures for the same month and 4-monthly period of 1953, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage increase or decrease
November 1954	23,884	461	24,345	—
November 1953	22,341	423	22,764	—
Increase or decrease	+1,543	+38	+1,581	+6.945
4 months ended 30/11/54	70,914	1,269	72,183	—
4 months ended 30/11/53	69,104	1,268	70,372	—
Increase or decrease	+1,810	+1	+1,811	+2.573

Butter in store at 30 November 1954 was 18,434 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage increase or decrease
November 1954	11,755	4,258	16,013	—
November 1953	14,434	—	14,434	—
Increase or decrease	—2,679	+4,258	+1,579	+10.939
4 months ended 30/11/54	30,807	8,358	39,165	—
4 months ended 30/11/53	35,951	29	35,980	—
Increase or decrease	—5,144	+8,329	+3,185	+8.852

Cheese in store at 30 November 1954 was 16,236 tons

If these figures are converted into butterfat equivalent, there is an increase of 3.748 per cent. in butterfat graded for the 4 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

Header Damage in Malting Barley

By C. J. CROSBIE, Machinery Instructor, and R. G. JOLLY, Fields Instructor, both of the Department of Agriculture, Christchurch

IT is essential that barley for malting should be of a uniformly high quality and growers who are unable to achieve the required standards are penalised in the price they receive for their grain. It is safe to say that each year thousands of bushels of what is potentially malting barley are spoilt through mishandling by the grower and through lack of appreciation of the care that must be exercised at certain stages of production.

PRACTICALLY all the malting barley is grown by farmers on contract, direct or through merchants, to maltsters and brewers. Growers who produce good sound lines of barley on contract have an assured market, irrespective of the stocks held. If the line is rejected, it has to be disposed of by the grower as feed barley, with consequent loss in return, and there may also be the grave risk of trying to sell a line on an over-supplied market.

Malting Process

Maltsters look for certain qualities in a line of barley; a good malting sample is one which is dry, plump, bright, even in maturity, sound, and free from other seeds. To give growers an appreciation of what quality means to the maltsters an outline of the malting process follows.

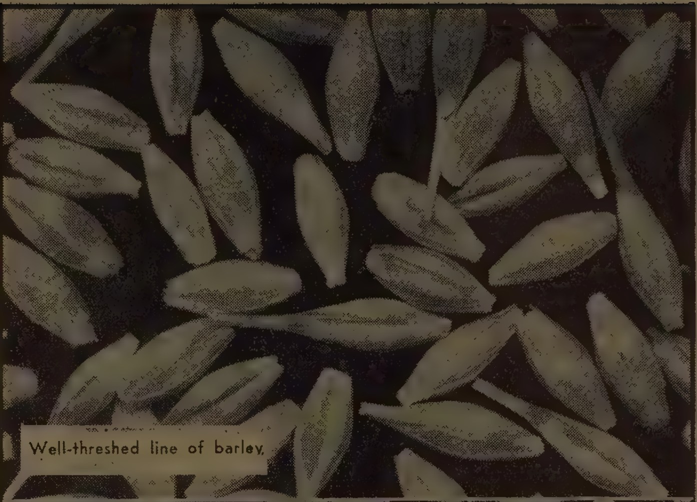
The principle of malting is to change the starch portion of each individual grain into sugars, and to get a high malt extract as much starch as possible must be converted. The practice is to steep the grain until a certain quantity of water is absorbed and then to spread the grain on the malting floor to germinate and grow. During the growing period the conversion from starch to sugars takes place. When maximum conversion has occurred growing is halted by the grain being kiln dried.

Some varieties require longer in the steep than do others. The normal time a line is left on the floor is from 6 to 8 days, depending on the malting process used.

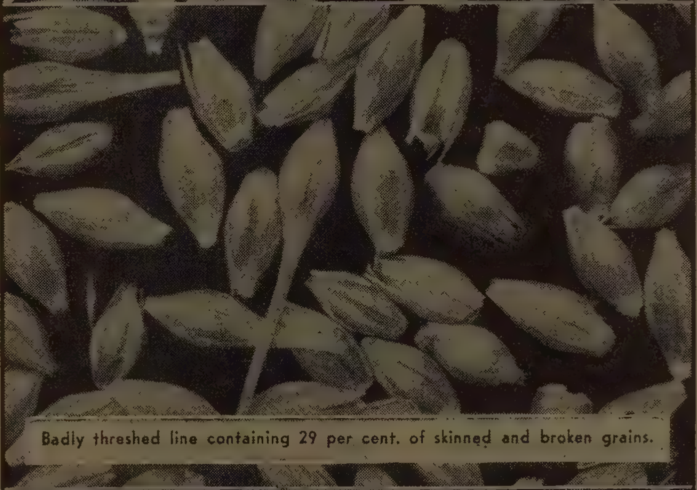
Evenness in Maturity

To get the maximum extract from a line of grain it is essential that each grain should absorb water at the same rate so that the moisture content of each grain when spread on the floor is the same and the rate of growth on the floor will be the same. In an uneven line of barley both the rate of water absorption and rate of growth will vary, resulting in some grains being fully converted while others are only partly converted.

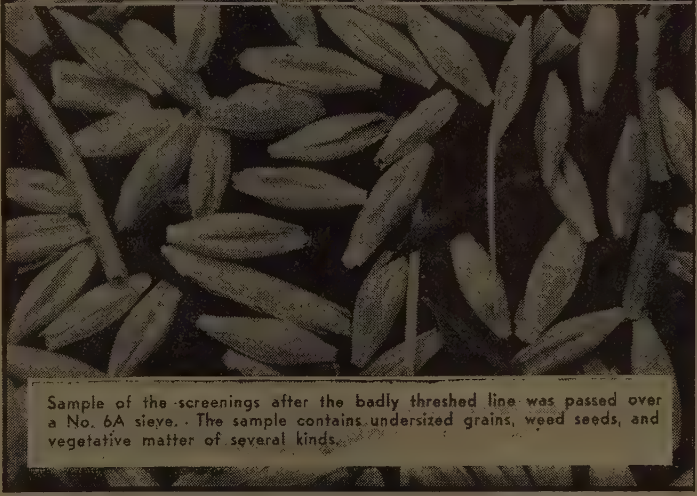
One of the main factors in unevenness is the mixing of varieties, and where growers have more than one variety care should be taken to keep each separate. Unevenness also



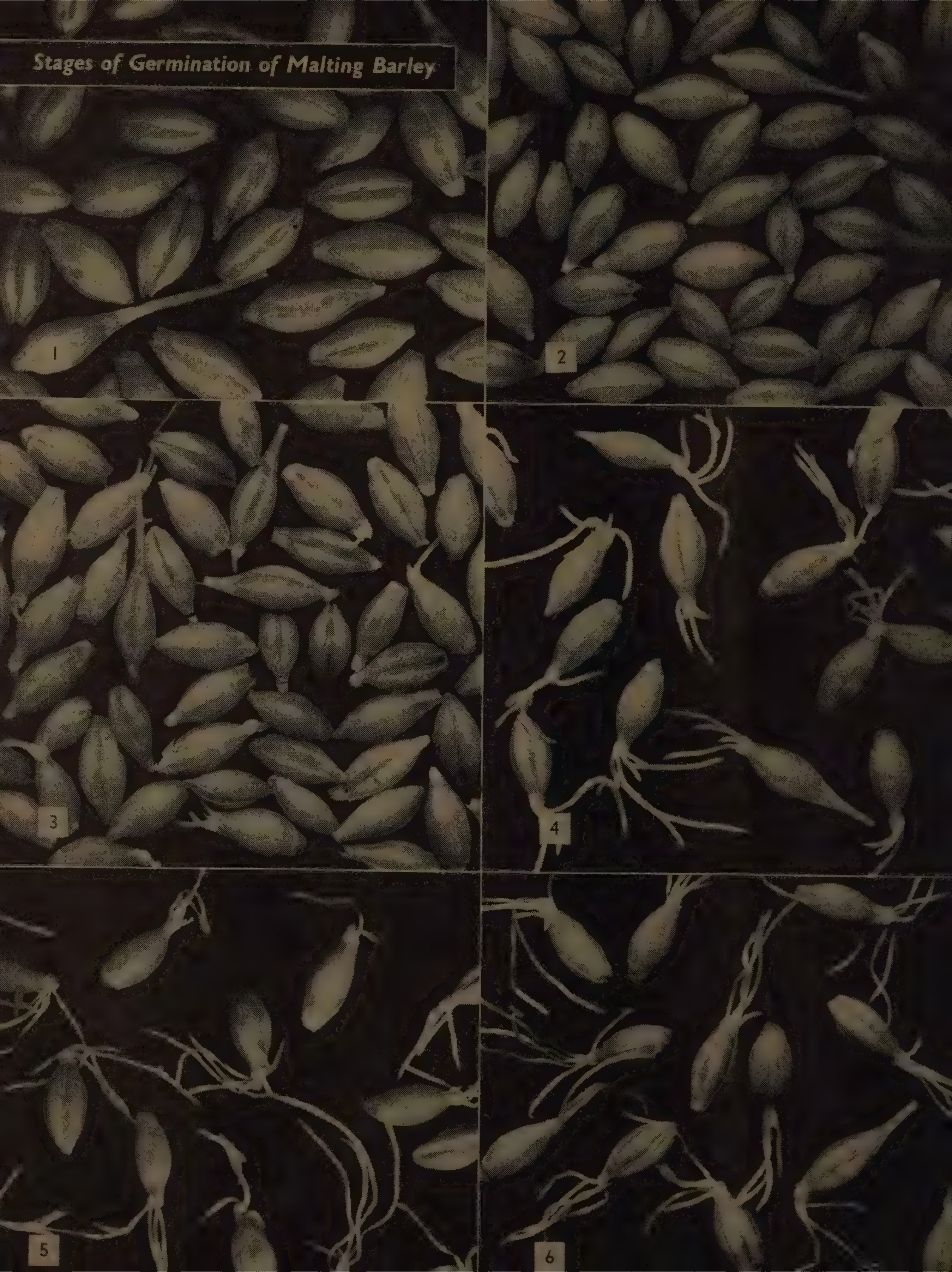
Well-threshed line of barley.



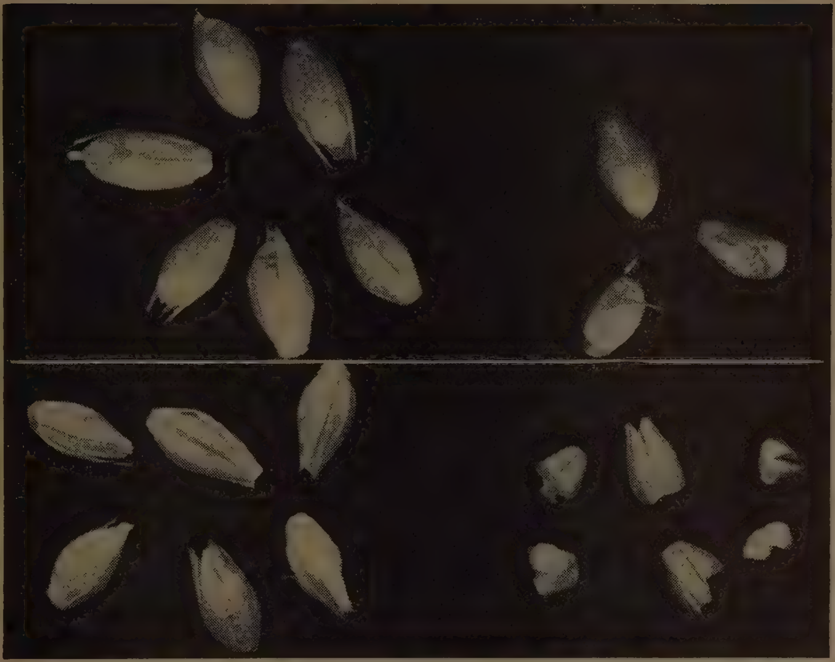
Badly threshed line containing 29 per cent. of skinned and broken grains.



Sample of the screenings after the badly threshed line was passed over a No. 6A sieve. The sample contains undersized grains, weed seeds, and vegetative matter of several kinds.



Stages of Germination of Malting Barley



Upper—Left: Grains from which the germs have been knocked out; they will not germinate and may ultimately rot on the germination floor. Right: Grains so badly skinned that all the seed coats are missing. The germ of one grain has been destroyed and it is doubtful if any of the grains would germinate. Lower—Left: Cracked and partially skinned grains that will absorb water quickly and germinate earlier than sound grains; an uneven germinating line results. Right: Broken grains. The half containing the germ will germinate, but the other half will not and all the grains will be very subject to mould growth.

occurs in crops which do not ripen uniformly, mainly because of soil variations, and such crops should be windrowed rather than direct headed.

Moisture

The condition of a line of barley is most important and a maximum of 15 per cent. of moisture is allowed under the grading standards. If the moisture content of the grains in a line varies, difficulty arises during the steeping process. Grains with too high a moisture content are over-steeped and go rotten; low-moisture-content grains will be insufficiently steeped and will grow slowly on the floor.

Every endeavour should be made to harvest the crop when it is perfectly fit. If rain interrupts harvesting of a paddock, the two portions should be kept separate because the moisture content of the grain harvested before and after the break may vary.

Damage

It is at harvesting time that many good crops of barley are ruined for malting. The whole malting process depends chiefly on evenness of germination, and growers who wish to avoid degrading or rejection of their barley should endeavour to prevent grain damage of the following types:—

1. **Damage to the germ:** When the germ or embryo of the grain has been damaged or knocked out the grain is dead and will not germinate.

2. **Skinning of the grain:** When the grain is skinned, either partly or completely, absorption of water into the grain takes place more rapidly. Such grains will germinate more quickly than sound grains, and by the time the line as a whole has been properly malted the earliest germinating grains may have died and begun to rot.

3. **Cracked and broken grains:** As with skinned grains, cracked and broken grains absorb water more readily and if the germ is undamaged, germinate more quickly. Most half grains may be removed during dressing before the malting process, but their presence in a line is indicative of damage to other grains that are still whole.

Damage of the above kinds can affect the malting process in two ways. Grains which fail to germinate are not converted into malt, so that not only is a lower amount of malt produced per bushel of grain, but the ungerminated grains contaminate the malt. Dead grains or early germinated grains which have died are also, under the moist conditions of the malting floor, a fruitful medium for the growth of mould. Mould growth impairs the quality of the malt and in extreme cases may make the whole batch worthless. In addition, unless the floor is thoroughly sterilised, a source of contamination is provided for the next malt.

When it is realised that a malt comprises perhaps 1000 bushels of grain the danger to the maltster from this source can easily be appreciated. Of the rejections made during the 1953-54 season, over 60 per cent. were for grain damaged as already described through faulty threshing. Types of damage mentioned and the development of mould growth on damaged grains are shown in the illustrations on this page and on page 17.

Harvesting Barley

The proportion of the barley crop that is direct headed has increased over the last few years until now about 40 per cent. of the crop is harvested in this way. The remainder is still cut with the binder, left in the windrow until fit, and harvested with a header fitted with a pick-up attachment.

To be successfully harvested by direct heading the crop must ripen evenly over the whole of the field. From field observations about 40 per cent. of the crops do this; over half of them ripen unevenly, owing to different levels of moisture and/or fertility over the field. These crops must first be windrowed with the binder.

Nevertheless from field and store observations it is quite evident that some growers are direct heading crops that should be windrowed before threshing or are not allowing sufficient time for crops to ripen evenly over the whole field before beginning direct heading. Failure to ensure that the crop has ripened evenly and is fit before the header is started can only lead to header damage to the threshed grains and lower financial returns for the grower.

Illustrations on opposite page: For high sugar extraction the germination capacity of a line of barley is of the greatest importance and germination must proceed evenly at a controlled rate for 6 to 8 days. The various stages of germination of a line of barley of the Kenia variety are shown. The samples of grain were taken from the floors of a large, modern, automatic malthouse, where germination proceeds under controlled conditions. 1—Barley after 56 hours in the steep. 2—Barley after 1 day on the floor. 3—Barley after 2 days on the floor. 4—Barley after 3 days on the floor. 5—Barley after 5 days on the floor. 6—Barley after 7 days on the floor. On the eighth day the barley is removed from the floor for dehydration.

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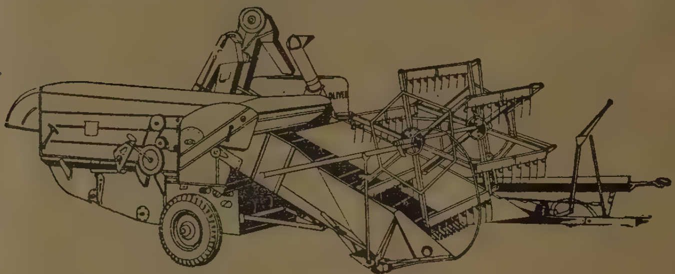

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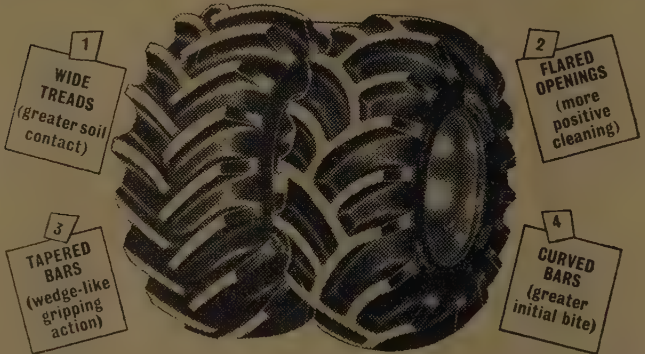
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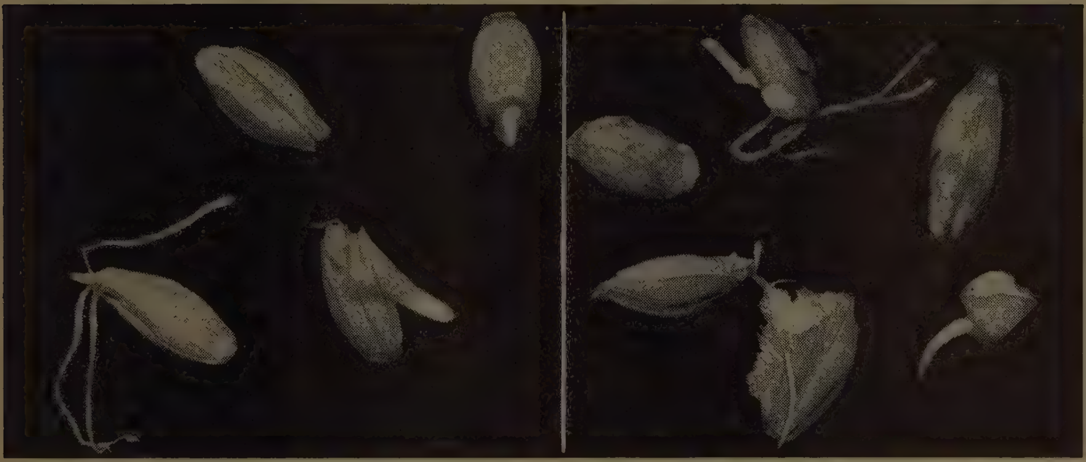

Above—Effect on germination of damaged grain. Left: If the germ has been knocked out of the grain, it will not germinate and may rot. If the grain has been damaged, it germinates unevenly and may present abnormal growths as shown. The final result is that little if any sugar is formed in the grain and therefore the extraction rate is exceptionally low. Right: Damaged grains are very susceptible to mould growth and when this occurs undesirable flavours occur in beer made from the little sugar extracted from these grains. Below—Sample from a line of well-threshed barley germinating evenly; a high sugar extraction rate will be obtained.

For successful harvesting the barley crop must be evenly ripened and fit. This implies that the moisture content of grains is down to at most 15 per cent. and that the stems are dry and a light golden colour. All traces of green must have disappeared from the stems and the flag will "talk" when rustled by the wind. When a fit head of barley is placed in the palm of one hand and pressed with the thumb of the other the centre stem may or may not break, several grains will break clear from the stem, and the awns will break cleanly from the grains. No difficulty should be experienced in threshing if a crop is in the condition just described. The lightest touch from the bars of the drum spinning at low revolutions will thresh the heads cleanly.

However, when a crop has been windrowed it is possible to find heads ready for threshing on top of the windrow and for some distance down inside it, but the heads on the bottom near the ground will be limp and far from fit. Under such conditions it is useless to start heading. The crop must be left until it is fit right through the windrow. A sunny day is not necessarily a drying day. For instance on the coastal belt of Canterbury, where a large proportion of the barley crop is grown, moisture-laden easterly winds coming in from the coast produce high humidity and such winds can absorb little moisture from the crop. Under such conditions the grower can only wait for the situation to improve. If the crop has been well windrowed and placed high up on a stiff stubble, no harm will result if the crop is left, even if it is caught by an occasional summer shower.

More grain is damaged by starting the header too soon than is damaged or lost by leaving the crop too long, though it is recognised that at midday under north-west wind conditions, when humidity is very low, the heads may become over-fit and header damage result even though the drum is slowed down and lifted. Under these conditions work must cease until the late afternoon or evening, when the crop will have "come back" and heading may be restarted.

Conditions last season were unusually dry and in the early part of the season the heads of barley ripened and were fit but the stalks were still green. Growers who harvested early in the season were able to thresh the grain at normal drum settings, but the green stalks wound round the drum. To overcome this, drum speed was increased, with the result that many lines contained a high percentage of damaged grains and were rejected. Later in the season, when crops had ripened evenly, no great difficulty was experienced in obtaining a sample that would pass the grader, especially when the operator took special care in setting his machine.

Speed of Header

The speed of the header must be suited to the crop. High yielding crops cannot be harvested as fast as those of lower yield. The throughput of a header is governed by its size and construction and also by the ability of the operator to set it. If a header is driven too fast, especially in barley, the grains will be caught up in the straw and carried over the straw walkers (or the straw rack); that is, there is such a bulk of straw moving

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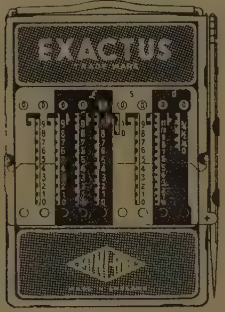

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These illustrations indicate the large quantity of grain that can be affected by header damage. Upper left—Large hangar used as a bulk store, showing sacks of barley being received from the rail and being stacked to form only part of the 65,000 bag capacity of this one store. Upper right—As required, the stacks are broken down and the sacks of barley emptied into the mouth of a large capacity suction pipe, which conveys the grain at the rate of about 1 bag per minute to another building, where it is passed over a seed dressing machine for cleaning before it is placed in the steep. Lower left—In the steeping process, which may proceed for 2 to 3 days according to the condition of the line, the water has to be changed every 12 hours and the grain periodically drained for a period and occasionally aerated with compressed air. Barley is shown being pumped from one steep to another. Each steep will hold 900 to 1000 bushels of barley at a time. Lower right—Looking along the corridor of a modern, automatic malthouse. On the right are the doors to 6 of the 8 floors and the automatic electrical switch gear; on the left are the pipes containing refrigerant for cooling the air if required, the air being passed into each floor by large capacity fans and ducts.

through the header that there is not time for all the grain to shake down through it.

However, the condition is easily recognised when a sack is held under the rear of the header at a level above the chaffing sieve and the sample of straw caught is examined for threshed grain. If grain is found, the forward speed of the header should be reduced.

Drum and Concave Settings

The operator's manual for the header being used will give the usual settings for threshing barley, usually with the proviso that lighter settings may be preferable for malting barley to reduce the chance of skinning it. Such settings should be used only when a field is being opened up and changes may be necessary according to the state of the sample received at the spout of the header. If skinning is occurring, immediate steps must be taken to rectify the position. Time spent in getting the correct header setting to suit the crop and the conditions at heading is time well spent.

No firm recommendations can be given for all headers engaged in harvesting barley, but the following general explanation should be helpful.

The cardinal rule in making alterations to a header in the field is to make one adjustment at a time and to observe the results carefully before the next adjustment is made. Making two or more adjustments at once will lead to confusion, because the observed result may be due to any or all of the alterations to the header.

If the barley is fit, no trouble should be experienced in threshing the grain from the heads. The manufacturer's recommendations for drum speed and setting will usually ensure this, so that few partially threshed heads will be found in the windrowed straw behind the header.

If skinned barley is found at the spout, immediate steps must be taken to lighten the threshing. Most of the header damage to barley is due to drum speed. The impact of the fast drum bars on the grains causes more damage than the rubbing action when the grains pass between the drum and the concave bars. Accordingly the first adjustment should be to reduce drum speed. The next is to lift the drum (or to lower the concave) to increase the distance between the drum and concave bars. The drum may be reduced to speeds as low as those normally used in threshing peas and the barley still be threshed efficiently.

Return to the Drum

There is a widely held view that if awned grains are found in the sample, no skinning will have occurred, but that this is wrong is shown by the middle illustration on the first page, in

20—DAMAGE TO BARLEY . . .

which awned and skinned grains can be seen.

This occurrence of skinned barley in a sample containing awned grains is caused by return to the drum and the resultant double threshing of grains carried over the sieves into the return auger. If grain is being returned with odd partially threshed heads, the return from the drum should be diverted. In some headers this can be done merely by directing the flow behind instead of in front of the drum. In other makes the screen under the return elevator may be removed so that all the returned samples are directed into the front of the chaffing sieve. In this way double threshing is avoided. Maltsters do not object to an odd partially threshed head in the sample, because all barley is passed over a seed-dressing machine before it is placed on the floor for germination. However, there should not be an excessive return of grain to the drum if the sieves and blast have been correctly set.

Cleaning the Sample

The sample coming off the grain tray on to the chaffing sieve contains grain with a mass of chaff and other vegetative matter that must be removed. This is done on the riddles (both adjustable and fixed) with an air blast. The top riddle is usually adjustable, as is the volume and (in some headers) the direction of the blast of air.

For harvesting barley the top adjustable riddle is set a half to three-quarters open, the second adjustable riddle (if there is one) about a fourth to a half open, and a special, fixed riddle may be used. It is usual to start with the blast half open and to increase it one notch at a time until grain is being blown over on to the return and then to close it up one notch. If grain is being blown out of the header, the blast has been opened far too much. Usually, however, more barley is carried over the top riddle with the chaff owing to lack of wind than is blown over because of too much wind.

The final cleaning takes place in the screen at the top of the header. Whether the screen is of the "Hart Scour" type with removable set screens or of the adjustable, English wire type no great trouble should be experienced in removing the last impurities from the sample. Small heavy weed seeds and other small rubbish are easily screened out in either screen, but the English wire screen can be set to take out small seconds of grain or opened up to let all the barley through the wires and to float large impurities such as straws and thistle heads right through the screen. However, thistle heads would not be in the sample at this stage if a fixed riddle had been fitted in the bottom of the shaker shoe.

Conditions for Satisfactory Heading

If the barley crop has not ripened evenly and is not fit when heading is begun, no operator can make a No. 1 grade sample. If, however, the crop is allowed to ripen evenly and heading is started only when it is fit, a good sample can be obtained without difficulty. Fit barley is easily threshed and cleaned, and with reasonable care no header damage will be caused to the grains.

Provided an intelligent interest is taken in the harvesting operation and alterations are made to the header as conditions change while harvesting is in progress, the average operator should have no trouble with this crop.

Grades of Malting Barley

To safeguard the interests of both buyers and growers a Barley Advisory Committee, consisting of representatives of the growers, buyers, and the Department of Agriculture, meets annually. Among the matters reviewed by this committee are grading standards. There are four grades for malting barley and the standards for them are shown in the table above.

STANDARDS SET FOR FOUR GRADES OF MALTING BARLEY

	Maximum allowance permitted in each grade (Percentage flinty grains to be expressed by count; all other percentages being by weight)								
	Flinty grain per cent.	Foreign matter (weeds, chaff, straw, etc.) per cent.	Wild oats per cent.	Skinned and broken grains per cent.	Tares and other round seeds per cent.	Sprouted grains per cent.	*Moisture per cent.	Bushel weight lb.	Disease
No. 1 grade shall be dry, plump, bright, sound, clean, and free from other grains	10.0	0.5	0.5	2.0	5.0	Nil	15.0	52	Trace
No. 2 grade shall be dry, plump, sound, reasonably bright and not stained, reasonably clean, and free from other grains	20.0	1.0	1.0	4.0	5.0	Nil	15.5	51	Trace
No. 3 grade shall be dry, plump, and reasonably free from other grains; may be slightly stained	35.0	2.0	2.0	5.0	5.0	Nil	15.5	50	Trace
No. 4 grade must be reasonably dry, plump, and reasonably free from other grains; may be stained and weathered	50.0	2.0	2.0	5.0	5.0	3.0	15.5	50	Trace

* A sample of barley containing more than 15.5 per cent. of moisture if it conforms otherwise to any of the grades specified shall be accepted as being in that grade subject to a mutually agreed on deduction for conditioning when necessary and a deduction in weight being made to bring the line into conformity with the standard of moisture reached by the line after conditioning.

Before grading all barley shall be screened through a 6A screen. The maximum amount of screenings permitted for malting barley shall be 15 per cent. At present screenings under 15 per cent. are subject to dockage at the rate of ½d. per bushel for every 2 per cent. over 5 per cent. (This dockage is under review and may be altered.) On tares and round seeds left in the screened sample there shall be a dockage deduction on a weight percentage basis at the rate of ½d. per 1 per cent.

The maximum district price is payable in respect of No. 1 grade only. The price for No. 2 grade is 3d. per bushel lower, the price for No. 3 grade is 6d. per bushel lower, and the price for No. 4 grade is 9d. per bushel lower than each maximum district price.

Right of Appeal

The grower has the right of appeal when a dispute arises between the grower and buyer because the parties are unable to agree about quality, and appeals against grading can be made through the Department of Agriculture. Appeals should be made on forms obtainable from offices of the Department and applications must be accompanied by a grading fee of 10s. When an application is received a sample is drawn and submitted to the Department of Agriculture Seed-testing Station, Palmerston North, for official grading. If as a result of the official grading the buyer's grading is not sustained, the buyer undertakes to purchase the line on its official grading and to refund the grading fee to the grower.

All photos by Standish and Preece.

Hasty Reaction May Lead to Damage

IN the average harvest field in New Zealand it is the delight of the onlooker to embarrass the header operator by fossicking in the straw behind the header and emerging clutching in his right hand held triumphantly aloft two or three heads of partially threshed grain. Unfortunately in these circumstances the natural reaction of the operator is to speed up the drum to obtain better threshing and in this way header damage is caused.

Growers, too, have been guilty of this practice, but they should learn to interpret their findings correctly before communicating their reactions to the header operator. In this way there will be a great reduction in the incidence of header damage to barley.

It is not generally known that finding 8 completely unthreshed heads (206 grains) in a running yard of straw behind a 6ft. header represents a loss of only 1 bushel of barley (worth about 9s.) per acre. Proportionally more heads must be found behind headers with wider cuts. It is most unusual to find 8 partially threshed heads in a running yard of straw, let alone 8 completely unthreshed heads, and it should be recognised that there is no need for excitement when a small handful of heads is found after a chain or so of straw has been examined.

—C. J. CROSBIE, Machinery Instructor,
Department of Agriculture, Christchurch

Lambing Estimates for 1954 Season

Though the number of breeding ewes in the Dominion in 1954 was 1,069,154 higher than in 1953, the estimated number of lambs is only 656,403 higher than in 1953 and the estimated lambing percentage of 95.73 is 1.54 lower than the 1953 record of 97.27. This decrease has taken place in the North Island, where breeding ewes have increased by 432,008 but the estimated number of lambs has decreased by 479,416, resulting in a decrease of 6.61 in the estimated lambing percentage. In the South Island breeding ewes have increased by 637,156 and the estimated number of lambs has increased by 1,135,819, giving an estimated lambing percentage of 103.01, an increase of 4.49 on the previous year's figure. The lowered lambing percentage in the North Island would appear to be due to the unfavourable conditions at tupping time. Totals for counties, districts, and the Dominion are set out in the following tables, which have been contributed by the Animal Industry Division of the Department of Agriculture.

NORTH AUCKLAND LAND DISTRICT

County	Breeding ewes (as at 1954)	Estimated percentage of lambs	Estimated number of lambs
Mangonui	31,168	77.0	23,999
Whangaroa	15,544	79.1	12,295
Hokianga	44,268	81.1	35,901
Bay of Islands	73,232	83.2	60,929
Whangarei	94,238	84.5	79,631
Hobson	95,672	84.5	80,843
Otamatea	97,798	87.0	85,084
Rodney	117,187	80.1	93,867
Waitemata	96,256	86.8	83,550
Eden	1,018	80.4	818
Great Barrier Island	4,653	61.6	2,866
Manukau	85,161	87.0	74,090
Franklin	169,583	85.8	145,502
Totals	925,778	84.19	779,375

AUCKLAND LAND DISTRICT

County	Breeding ewes (as at 1954)	Estimated percentage of lambs	Estimated number of lambs
Raglan	537,036	88.2	473,666
Waikato	209,678	91.0	190,807
Waipa	218,765	94.9	207,608
Otorohanga	201,930	94.6	191,026
Kawhia	84,700	85.9	72,757
Waitomo	432,349	84.8	366,632
Taumarunui	147,160	86.1	126,705
Coromandel	36,599	80.1	29,316
Thames	11,398	86.7	9,882
Hauraki Plains	24,960	86.8	21,665
Ohinemuri	29,990	89.5	26,841
Piako	150,825	94.8	142,982
Matamata	361,461	95.0	343,388
Tauranga	173,765	89.5	155,520
Rotorua	186,363	88.0	163,999
Taupo	34,929	83.2	29,061
Whakatane	62,051	89.4	55,474
Totals	2,903,959	89.79	2,607,329

TARANAKI LAND DISTRICT

County	Breeding ewes (as at 1954)	Estimated percentage of lambs	Estimated number of lambs
Ohura	148,428	88.5	131,359
Whangamomona	59,294	79.2	46,961
Clifton	95,067	86.5	82,233
Taranaki	33,978	95.1	32,313
Inglewood	70,416	99.0	69,712
Egmont	32,921	98.3	32,361
Stratford	127,825	92.4	118,110
Eltham	66,075	97.8	64,621
Waimate West	8,738	95.4	8,336
Hawera	89,534	92.6	82,908
Totals	732,276	91.35	668,914

HAWKES BAY LAND DISTRICT

County	Breeding ewes (as at 1954)	Estimated percentage of lambs	Estimated number of lambs
Wairoa	395,413	82.0	324,239
Hawkes Bay	1,001,291	88.8	889,146
Waipawa	466,078	94.2	439,045
Waipukurau	157,398	92.6	145,751
Patangata	531,783	86.9	462,119
Dannevirke	331,171	98.7	326,866
Woodville	89,287	97.7	87,233
Weber	57,247	85.9	49,175
Totals	3,029,668	89.90	2,723,574

GISBORNE LAND DISTRICT

County	Breeding ewes (as at 1954)	Estimated percentage of lambs	Estimated number of lambs
Opotiki	51,031	78.3	39,957
Matakaoa	59,150	80.4	47,557
Waiapu	243,767	82.0	199,889
Uawa	109,723	82.0	89,973
Waikohu	336,173	85.0	285,747
Cook	442,630	87.0	385,088
Totals	1,242,474	84.36	1,048,211

WELLINGTON LAND DISTRICT

County	Breeding ewes (as at 1954)	Estimated percentage of lambs	Estimated number of lambs
Patea	225,508	93.6	211,075
Kaitieke	81,563	91.5	74,630
Waimarino	190,558	85.7	163,308
Waitotara	152,146	91.3	138,909
Wanganui	295,154	86.1	254,128
Rangitikei	1,024,043	99.0	1,013,803
Kiwitea	272,361	95.3	259,560
Pohangina	144,996	97.2	140,936
Oroua	238,800	100.4	239,755
Manawatu	154,177	99.1	152,789
Kairanga	114,727	100.1	114,842
Horowhenua	132,250	89.3	118,099
Hutt	70,739	82.4	58,289
Makara	46,471	77.8	36,154
Pahiatua	170,809	80.0	136,647
Akitio	156,401	85.0	132,941
Castlepoint	96,013	84.8	81,419
Eketahuna	151,125	86.6	130,874
Mauriceville	53,061	83.7	44,412
Masterton	316,340	85.3	269,838
Wairarapa South	191,198	87.8	167,872
Featherston	370,729	87.3	323,646
Chatham Islands	46,363	75.0	34,772
Totals	4,695,532	91.55	4,298,698

MARLBOROUGH LAND DISTRICT

County	Breeding ewes (as at 1954)	Estimated percentage of lambs	Estimated number of lambs
Sounds	90,794	66.5	60,378
Marlborough	239,515	87.5	209,576
Awatere	183,876	89.5	164,569
Kaikoura	130,009	90.0	117,008
Totals	644.194	85.62	551,531

County	Breeding ewes (as at 1954)	Estimated percentage of lambs	Estimated number of lambs
NELSON LAND DISTRICT			
Waimea	163,430	91.0	148,721
Takaka	27,531	87.0	23,952
Collingwood ..	13,891	82.0	11,391
Buller	2,112	73.8	1,559
Murchison ..	31,823	88.3	28,100
Inangahua ..	18,194	97.4	17,721
Totals	256,981	90.06	231,444
WESTLAND LAND DISTRICT			
Grey	33,148	108.2	35,866
Westland	39,442	112.2	44,254
Totals	72,590	110.37	80,120
CANTERBURY LAND DISTRICT			
Amuri	243,570	85.5	208,252
Cheviot	160,977	90.7	146,006
Waipara	324,367	101.6	329,557
Kowhai	98,225	112.0	110,012
Ashley	72,350	99.0	71,627
Rangiora	62,022	102.5	63,573
Eyre	76,742	111.1	85,260
Oxford	91,382	105.0	95,951
Tawera	50,763	77.4	39,291
Malvern	183,951	102.5	188,550
Paparua	56,432	105.3	59,423
Waimairi	2,717	104.0	2,826
Heathcote	8,014	90.2	7,229
Halswell	17,468	97.8	17,084
Mount Herbert ..	36,346	104.0	37,800
Akaroa	88,201	104.6	92,258
Wairewa	66,747	100.7	67,214
Springs	40,400	112.8	45,571
Ellesmere	101,481	113.7	115,384
Selwyn	171,619	89.4	153,427
Ashburton	1,030,112	109.0	1,122,822
Geraldine	314,231	102.5	322,087
Levels	252,064	110.7	279,035
Mackenzie ..	311,058	85.4	265,644
Waimate	583,639	103.7	605,234
Totals	4,444,878	101.94	4,531,117
OTAGO LAND DISTRICT			
Waitaki	507,653	104.5	530,497
Waihemo	110,456	100.0	110,456
Waikouaiti ..	79,188	82.5	65,330
Peninsula	18,578	103.0	19,135
Taieri	187,776	96.0	180,265
Bruce	286,410	104.0	297,866
Clutha	550,357	107.0	588,882
Tuapeka	405,428	98.0	397,319
Maniatoto	247,715	97.0	240,284
Vincent	265,572	99.0	262,916
Lake	137,255	88.0	120,784
Totals	2,796,388	100.62	2,813,734

SOUTHLAND LAND DISTRICT

County	Breeding ewes (as at 1954)	Estimated percentage of lambs	Estimated number of lambs
Southland ..	2,368,226	113.5	2,687,937
Wallace	735,006	104.0	764,406
Stewart Island ..	2,580	71.0	1,832
Totals	3,105,812	111.22	3,454.175
DISTRICT ESTIMATES			
North Auckland ..	925,778	84.19	779,375
Auckland	2,903,959	89.79	2,607,329
Gisborne	1,242,474	84.36	1,048,211
Hawkes Bay ..	3,029,668	89.90	2,723,574
Taranaki	732,276	91.35	668,914
Wellington ..	4,695,532	91.55	4,298,698
Marlborough ..	644,194	85.62	551,531
Nelson	256,981	90.06	231,444
Westland	72,590	110.37	80,120
Canterbury ..	4,444,878	101.94	4,531,117
Otago	2,796,388	100.62	2,813,734
Southland ..	3,105,812	111.22	3,454,175
Totals	24,850,530	95.73	23,788,222

Dominion Totals

The following table shows the estimated lambing for the North and South Islands for the previous 5 years together with the number of lambs tailed.

Year	Number of breeding ewes	Estimated percentage of lambs	Estimated number of lambs	Number of lambs tailed
NORTH ISLAND				
1954 ..	13,529,687	89.63	12,126,101	—
1953 ..	13,097,679	96.24	12,605,517	12,836,745
1952 ..	12,717,819	93.10	11,839,659	12,007,684
1951 ..	12,620,097	91.75	11,579,023	11,876,012
1950 ..	12,227,145	93.96	11,489,151	11,722,316
1949 ..	12,071,619	94.47	11,404,104	11,735,061
SOUTH ISLAND				
1954 ..	11,320,843	103.01	11,662,121	—
1953 ..	10,683,697	98.52	10,526,302	10,758,060
1952 ..	10,245,527	96.78	9,916,102	10,154,586
1951 ..	10,018,394	97.59	9,777,423	9,938,012
1950 ..	9,654,322	97.77	9,438,768	9,516,145
1949 ..	9,428,084	99.05	9,338,395	9,434,515
DOMINION				
1954 ..	24,850,530	95.73	23,788,222	—
1953 ..	23,781,376	97.27	23,131,819	23,594,805
1952 ..	22,963,346	94.74	21,755,761	22,162,270
1951 ..	22,638,491	94.34	21,356,446	21,814,024
1950 ..	21,881,467	95.64	20,927,919	21,238,461
1949 ..	21,499,703	96.48	20,742,499	21,169,576

Drenching to Control Worms in Sheep

THE results of 60 controlled field drenching trials carried out in New Zealand to measure the body-weight response of young sheep to drenching with phenothiazine were discussed by L. K. Whitten, Parasitologist, Department of Agriculture Animal Research Station, Wallaceville, in a recent paper to the New Zealand Society of Animal Production. In this article adapted from an address by him to the Ruakura Farmers' Conference 1954 attention is focused on some of the trials in which more positive results were obtained, it being borne in mind that these were the exception rather than the rule.

FIRST, it should be pointed out that all the comparisons were made between drenched and undrenched groups of animals grazing together in the same paddock. In some trials a single dose was given and in others repeated doses were given. Only sheep under 12 months of age were used. The trials covered all seasons of the year and were spread over most of the main sheep raising areas of New Zealand.

Trials at Kirwee

At Kirwee a series of trials carried out over a number of years comparing drenched and undrenched groups under a variety of conditions of feeding and management gave the following results. In unweaned lambs there was no response to drenching in any of the 3 years in which phenothiazine was used. In lambs on fattening crops weight increases of 4lb. and 6lb. were seen in two out of four seasons and in over-wintered hoggets responses of 4lb. and 6lb. occurred in two out of five seasons.

The responses at Kirwee might be expected to be smaller than might occur in other parts of the country due to the complete absence there of the large stomach worm (*Haemonchus*), which is recognised as being one of the most harmful of such parasites and also the one most easily controlled by drenching. In one additional trial at Kirwee a definite response was obtained in a severe outbreak of trichostrongylosis that occurred in an experimental mob kept on a very low plane of nutrition. On this occasion a 5lb. to 6lb. weight response followed two drenches at 3-weekly intervals, a result that was duplicated in groups placed on both high and low planes of nutrition after drenching.

In 1943-44 lambs running on heavy flat country at Wairoa were drenched with 1½ times the recommended dose of phenothiazine at 14-day intervals from the age of 6 weeks until they were 12 months old. This intensive drenching was quite uneconomic, but was adopted in order to obtain a maximal response under this particular set of conditions. The greatest body-weight difference occurred in May, when the drenched group was 9lb. heavier than the controls. Later the two curves converged and the mean weights were identical after the spring growth had become well established.

Later Trials

In a later trial carried out at Manutuke in 1947 groups of animals on long and short feed were dosed every 3 weeks from April until August. At the end of the trial there was a difference of 14.5lb. on the short feed, but only 3.7lb. on the long feed.

More recently a trial was carried out on improved hill country in the Manawatu, where lambs were drenched at monthly intervals from January to June with phenothiazine and with bluestone/nicotine. Body-weight differences were again greatest in May, when the bluestone/nicotine group were 5.8lb. and the phenothiazine group 11.6lb. heavier than the controls. The worm egg count curve suggested that the same result might have been obtained by drenching only in March, April, and May. This suggestion was tested out in the following season on another property where 5 groups were used. The trial ran from January to August, but again the differences were greatest in May. The weight gains from January to May were as follows:—

	lb.
Controls	0.8
Monthly drenching January-June bluestone/nicotine ..	2.0
Monthly drenching January-June phenothiazine	4.8
Monthly drenching March-May phenothiazine	4.5
Monthly drenching January-June bluestone / nicotine alternating with phenothiazine	4.6

The responses on this property were small, but it appeared that monthly drenching with phenothiazine over the whole period was more than was necessary, a view that is supported by the fact that alternating it with an inferior drug or restricting its use to March, April, and May did not lessen its response.

A recent experiment at Silverstream near Wallaceville has provided data on the value of phenothiazine during severe outbreak conditions. Backward lambs on a low plane and forward lambs on a higher plane of nutrition were used, and drenching every 2 to 3 weeks from February until July resulted in an 8lb. to 9lb. body-weight difference in both groups. More striking, however, was the difference in the mortality between the drenched and undrenched groups. The mortality was 10 per cent. in the drenched and over 50 per cent. in the undrenched group.

Summary of Field Trials

In summary then it can be stated that in all these field trials, which involved some 5000 animals, a body-weight response of 5lb. to 10lb. occurred in seven and a response of over 10lb. in only two out of 60 trials. In the remaining 51 trials the results were either not significant or less than 5lb. Body-weight differences were usually greatest in the late autumn and early winter and tended to disappear completely with the establishment of spring pasture growth.

In instances where symptoms had developed to the stage where some mortality occurred, the value of phenothiazine in reducing the mortality was sometimes marked and this feature is probably the most important aspect of the use of phenothiazine.

It is clear with the wide range of possible responses as shown in this series of trials, that it is a difficult task to make definite recommendations for the drenching of sheep. The following suggestion, however, can be made. Mature sheep seldom require drenching. There is one possible exception to this, however, and that is in the case of an outbreak in lambing ewes. This is a rather unusual occurrence, but when it does occur the large stomach worm is generally implicated. If ewes are very anaemic at lambing time, treatment may be worth while, but in the absence of such a sign it is unlikely that it is warranted.

Drenching of Unweaned Lambs

The drenching of unweaned lambs is also of very doubtful value. This opinion is based on a complete lack of any experimental evidence that is of value, supported by the fact that serial observations on flocks in various parts of the country have indicated that worm infestations do not build up to dangerous levels until later. Further support is given by the results of the examination of material sent in to the diagnostic section from suspected outbreaks of parasitic disease. In March only 5 per cent. of such specimens have shown high counts, whereas in May 50 per cent. of the specimens examined showed high counts. For the same reason drenching at weaning is not considered now to be quite so important as it has been previously. Support for this view has been obtained from the examination of lambs killed at Ruakura which have shown very clearly that high counts at weaning are very much the exception both for *Haemonchus* and *Trichostrongylus*, though the latter does tend to show a more or less spectacular rise by mid-March.

In autumn positive results are more likely to be obtained, but here again on properties where losses are negligible the value of drenching is very questionable. Where losses are serious or during severe outbreaks drenching can have a very marked effect both on thrift and on mortality. Under such circumstances drenching more frequently than every 3 to 4 weeks is seldom necessary. It is seldom necessary to drench before March, though exceptional weather conditions may result in outbreaks of haemonchosis in February, and treatment in these circumstances may be profitable. Marked anaemia should give adequate warning in such outbreaks and should be looked for when rain follows a dry period in the early summer months. Seldom is it necessary to continue drenching after the middle of June. Considerable saving can be effected by concentrating on the tail-end of the mob and by concentrating on the March to May period. An extra drench then would be much more valuable than one given at weaning.

Care of Livestock during February

Contributed by the Animal Research Division

PREPARATIONS FOR TUPPING

IF ewes have been held on short pasture since weaning, they should now be in good hard condition. About 21 days before tupping they should be crutched and given the best pasture available. Experiments at the Department of Agriculture's Animal Research Station, Ruakura, have shown that flushing ewes for 3 weeks before tupping and keeping them on good pasture for 3 weeks after tupping begins increases the number of lambs marked by 20 per cent. Rams, too, should be crutched and flushed for about 3 weeks before tupping. They should be dipped before the flushing period, as dipping too close to tupping appears to reduce ram fertility.

COBALT DEFICIENCY

Bush sickness can be prevented completely by topdressing annually with cobaltised superphosphate, and in the North Island at least this is best applied in the usual autumn topdressing. Cobaltised superphosphate prepared in North Island works contains 3lb. of cobalt sulphate per ton; 2cwt. of this fertiliser contains sufficient cobalt for 1 acre. In the South Island cobaltised superphosphate contains 6lb. of cobalt sulphate per ton, and 1cwt. of this fertiliser per acre contains sufficient cobalt. If greater quantities of fertiliser than those indicated are used, the additional amount need not be cobaltised. For fuller details consult the Department of Agriculture's Bulletin No. 180.

SOWS AND WEANERS

Sows with litters should be fed at the rate of 4 gallons of skimmed milk plus 2/3 gallon per pig suckled. Sows and litters should be allowed at least 2 hours' grazing per day. It is an advantage to provide water sprays for both suckling and dry sows during summer, as since pigs possess very few sweat glands, they can be kept cool only by the evaporation of water from the skin. Litters over 3 weeks of age must have skimmed milk and meal available at all times. Observations at Ruakura have shown that piglets suckle at intervals of 75 to 90 minutes throughout the 24 hours, and after the sixth week they visit the creep after each suckling. Good creep management can add 6 to 10lb. per pig to the weaning weight. Weaned sows must be well fed to ensure successful mating. A ration of 4 to 6 gallons of skimmed milk daily plus grass is essential. Weaned pigs should be fed 1½ to 2 gallons of skimmed milk daily. If the milk available is not sufficient to provide this, the feeding of meal to supplement the milk ration, replacing 1 gallon of milk with 1lb. of meal, is highly profitable at present meal and meat prices.

PULLORUM DISEASE IN POULTRY

Preparations should now be made for the autumn hatch by blood testing the flock for pullorum disease and by cleaning and fumigating the incubators. A vacuum cleaner is ideal for cleaning, and advice on fumigation may be obtained from the local Poultry Instructor.

BOVINE INFERTILITY

Infertility may be due to several infectious diseases which are known to be present in New Zealand and for which reliable tests are now available. If more than the usual number of cows are still empty, veterinary assistance should be sought promptly.

FACIAL ECZEMA

If warm rains fall in February after a spell of hot, dry weather, facial eczema is likely to occur in districts which are usually affected. Experience during recent years has shown conclusively that the disease can be prevented by shutting sheep up at the rate of at least 100 to the acre as soon as the rains fall and keeping them so confined until the weather becomes either hot and dry or much cooler and the pasture visibly hardens. If dry periods occur, plans should be made for action along these lines. Good hay at the rate of 2lb. per sheep per day will prevent loss of condition. Even if adequate hay is not available, when ample water is provided ewes are not harmed by 1 or 2 weeks' starvation. It is better to take precautions too often than to run the risk of a disastrous outbreak of facial eczema. If crops of rape, kale, turnips, or chou moellier are available, they can be grazed safely during the dangerous period. The grazing of such crops is the only satisfactory way of preventing the disease in lambs, which react badly to restricted grazing. Lucerne has not proved safe, possibly because ryegrass is frequently present in it as a weed, but in East Coast districts paddocks of pure white clover are safe and lambs do well on them.

CARE OF CALVES

Autumn is a critical period for calves. Deaths during winter can be eliminated by rotating the calves through the paddocks ahead of the cows at intervals of 3 or 4 days. If this is not being done, it should be begun immediately. Calves treated in such a way will be up to 100lb. heavier as yearlings than those kept confined in a calf paddock. If calves are unthrifty and scouring, it may be necessary to give 2 or 3 doses of phenothiazine at 3-weekly intervals, but this is seldom necessary with calves which are rotationally grazed.

COPPER DEFICIENCY

Scouring in cattle and staggering in lambs grazing on peat and other copper-deficient land can be prevented by topdressing the pastures in autumn with 5lb. of bluestone per acre. Copperised superphosphate is now available or the bluestone may be mixed with lime. For fuller particulars the Department's Bulletin No. 238 should be consulted.

VITAMIN A FOR GROWING AND LAYING BIRDS

Vitamin A is essential to poultry for protection against various infections, particularly colds and contagious catarrh. Poor egg production is a common feature of an inadequate supply of vitamin A to laying birds. Greenfeed is a useful source of vitamin A, but at certain periods of the year when this becomes scarce or poor in quality it may be of little value. Growing birds on open range may suffer from vitamin A deficiency during very prolonged dry spells of weather. Though there is apparently plenty of greenfeed available, it may be of very poor quality. The addition of a vitamin A supplement such as fish liver oil during times of greenfeed shortage is advisable for both growing and laying birds. The amounts used vary according to the age of the birds and the potency of the oil used. The quantity advised by the manufacturer of the oil should be added to the diet. Further advice on the use of vitamin A supplements may be obtained from the local Poultry Instructor of the Department of Agriculture, and a special leaflet on the subject is available from main offices of the Department.

Autumn-sown Pastures

Seasonal Notes by the Extension Division

A SEED-BED for pasture should be fine, firm, moist, and warm at the time of sowing, and early autumn sowings are generally the most successful.

AFTER GRASS WHEN the "grass to grass" method is used sufficient time must be allowed for the preparation of a seed-bed. It is not possible to prepare a consolidated seed-bed on a mass of undecomposed turf. Old pasture must therefore be broken up at least by the end of December. If the turf is undecomposed when the grass seed is sown, the soil organisms responsible for its decomposition compete with the new grass for nitrogen and tend to produce a yellowy condition of the grass in late winter and spring. Where decomposition is more advanced the proportion of available nitrogen to undecomposed material is higher and there is less competition for it. Apart from the time required to enable the turf residues to rot time is also essential to allow the soil particles to re-unite and develop a continuous moist layer of soil to within 1in. of the ground surface. A properly prepared seed-bed should feel quite firm underfoot. Many farmers make the mistake of using deep working implements such as discs or a rotary hoe until just before sowing; only the harrows and roller should be used in the latter stages of seed-bed preparation if proper consolidation is to be obtained.

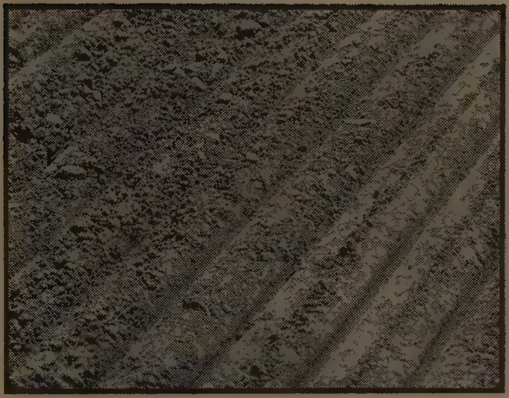
AFTER SOFT TURNIPS It is a common North Island practice to sow pastures after soft turnips grown for summer supplementary feeding. This leaves little time for seed-bed preparation, but is a compromise worth accepting. Only shallow cultivation with light discs and harrows should follow the feeding off of such a crop so that some consolidation is retained. Where grass is to follow a very weedy summer forage crop ploughing is necessary followed by increasingly shallow top working with discs and harrows.

—*G. L. BANFIELD*

* * *

PRACTICES IN ARABLE DISTRICTS AUTUMN sowings usually follow a fallow or fed-off crops such as rape and soft turnips or grain crops such as cereals or peas. Best results are obtained by prior fallowing, especially on light to medium soils in low rainfall areas, and on stiff, heavy soils and/or weedy soils generally. The summer fallow and accompanying cultivations, with progressively shallower workings and rolling as the fallow proceeds, control weeds, consolidate the soil, conserve moisture, and allow ample time to work up a fine, firm seed-bed for sowing down to pasture at any time from mid-January to mid-April. The best time to sow will depend on normal local climatic conditions, will vary according to the locality, and will be governed largely by the anticipated start of autumn rains. When pasture is sown down after crops the time of sowing will depend on when the crop is finished. This generally necessitates more hurried ground preparations, and sometimes results in later sowings than after fallow. In these circumstances cultivation cannot begin before mid-February or early March.

On light to medium free-working soils following rape, turnips, or burnt-off stubble ploughing can often be omitted and the desired tilth obtained merely by two double-cut discings followed by harrowing and rolling. Where there is much stubble, weeds, or other surface trash to dispose of, or in most instances on stiff, heavy, difficult-to-work soils, ploughing is advisable, followed by one or more double discings and harrowing. The use of a clodcrusher may be necessary on very cloddy ground, or it may pay to use a grubber or hustler rather than discs where "twitchy" weeds are prevalent. Whatever the implements employed and the number of times they are used the aim should be to arrive at a fine, firm, clean tilth and even surface to ensure even sowing depth and obtain early and uniform "strike".



A rolled surface ready to receive grass seed.

DRILLING SEED In low rainfall areas drilling seed is usually the most satisfactory method of sowing. Deep drilling should be avoided, as grass and clover seeds are small. Half an inch is ample depth to sow. In low rainfall South Island districts where orthodox 7in. drill spacings take considerable time to fill the inter-row spaces and provide efficient ground cover sub-surface broadcast coulters which space at 3½in. should be used. The seed-bed should be clean; otherwise these coulters may give trouble through blockage.

—*N. GREAVES*

* * *

LIME IN CANTERBURY PASTURES should be sown down on limed ground, the lime being applied where possible before the final cultivation. In spite of the interest caused by trace elements in recent years lime remains a basic necessity for most Canterbury soils, and though the effect of applied lime is not always spectacular, it is still fundamentally very important. On areas which are being developed initial dressings of fairly large quantities of lime are required to reduce the acidity of the soil to a level compatible with optimum plant growth as well as assuring an adequate supply of available calcium for plant food. For this lime dressings of 1 ton to 1½ tons per acre appear to be sufficient for the lighter plains soils, and 2 tons to 2½ tons per acre make the necessary improvement in soils of the clay downs.

Once this basic amount has been applied to a soil and the field sown out to pasture consideration has to be given to maintenance. It is generally agreed that losses from leaching and stock uptake are in the vicinity of 3 to 5cwt. per acre per annum, and this annual loss can be made good by maintenance dressings of 1 ton of lime applied as topdressing to the pasture every 4 or 5 years. The Department of Agriculture has placed its soil testing service at the disposal of the farmer, and if there is any doubt as to the lime status of any particular soil or paddocks, the results of soil tests taken from these areas will indicate whether there is sufficient lime or whether further applications should be made. In this service the results of laboratory soil testing are interpreted by the local Instructor, who knows the particular soil type and who can advise the farmer of the programme of liming which should be undertaken.

—*J. D. WRAIGHT*

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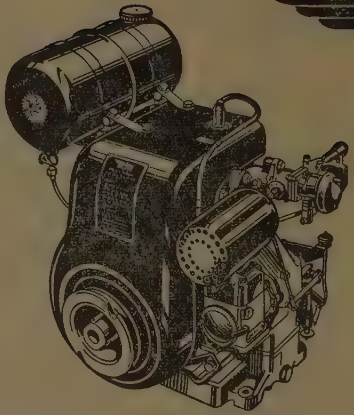

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Prevention of Poultry Diseases by Good Hygiene

By A. C. HOWSE, Veterinarian, Department of Agriculture, Christchurch

THE main diseases in New Zealand among commercial poultry flocks are fowl paralysis, coccidiosis, worms, and pullorum in that order of importance. Tuberculosis is also common, but only in poultry kept on general farms and in backyards (poultry kept in small outside runs or running at large in yards and paddocks near the house); it is rare on poultry farms where the birds are kept intensively. All the diseases mentioned have one thing in common; they are spread mainly or entirely through the droppings. They are ground or soil infections, and any measures which may be taken to prevent their spread should be devised with this in mind. This article deals particularly with good hygiene methods of preventing poultry diseases.

IN New Zealand there is a great preponderance of fowl paralysis, which, with associated conditions, causes more loss in New Zealand poultry than all the other diseases put together. The same position applies wherever poultry are kept commercially throughout the world.

Fowl paralysis occurs in at least three well-known forms. First, there are the cases showing paralysis in leg, wing, or other parts of the body. Then the condition known as big liver disease is a form of fowl paralysis. There is a third or blood form of the disease in which the affected bird just wastes away.

Research has shown that this disease is contracted mainly during the first few weeks of life and that birds are highly resistant to infection, if not immune, after the age of 5 months. In addition a proportion of infection is hereditary, being transmitted through the egg, but hygiene can do little to control this form of the trouble.

Some breeds and strains of poultry are particularly susceptible and others correspondingly resistant to fowl paralysis, which fact affords a means of fighting it. However, this article deals only with keeping fowl paralysis down by good hygiene and management.

As birds are particularly susceptible during the first few weeks of life, it is obviously of great importance to keep them as free as possible from all direct and indirect contact with older stock during that time. This is not easy on the usual poultry farm, where several hundred or thousand birds are kept intensively on a small acreage, particularly in view of the importance of indirect contact.

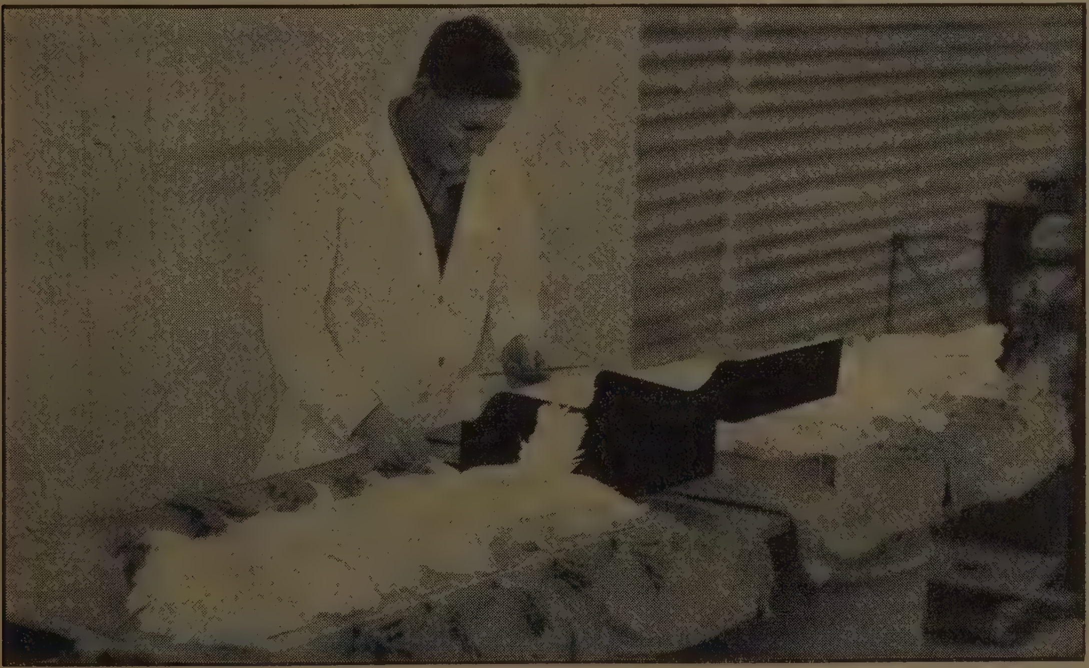
Coccidiosis

Caused by an intestinal parasite—what is known as a protozoan organism, which is different, for instance, from intestinal worms—coccidiosis is usually first noticed with the appearance of blood-stained droppings when chickens are about 8 weeks old. If the disease is left unchecked, its early effects will be followed by deaths in a large proportion of the growing stock.

Nowadays there are a large variety of drugs which are effective in checking coccidiosis. Most of them are in the sulphonamide group, though they have recently been reinforced by the new nitrofurazone preparation. Sulphamezathine, now well known and widely used, was followed by other drugs in the same group, sulphaquinoxaline, sulphapyridine, and so on. Originally the usual practice was to wait until symptoms appeared and then use one of these drugs. Latterly there has been a tendency to use these drugs continuously in small doses from an early age onward so that symptoms of the disease never appear and at the same time the birds acquire an immunity.

Until 1945, however, hygienic measures and very little else had to be relied on for the prevention of coccidiosis. In that year the first of the sulpha drugs came into use, but before then nothing was known which had a specific lethal effect on coccidia.

Nowadays the available drugs are so effective and so easy to use that there is a tendency to rely on them too much. In fact, in some parts of the world it is the custom to keep a brooder house specially dirty and in-



Birds laid out for blood testing for pullorum disease. As a result of widespread acceptance by commercial poultry keepers of the blood testing service operated by the Department of Agriculture this disease among chickens is comparatively rare.

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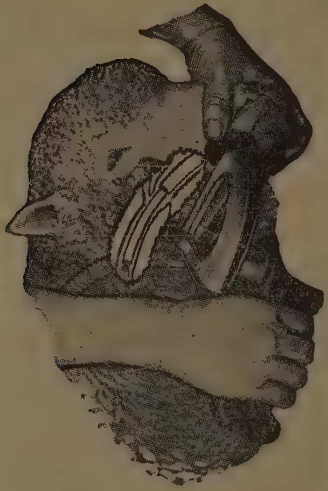

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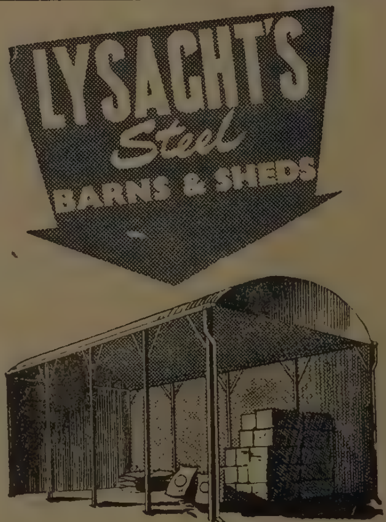

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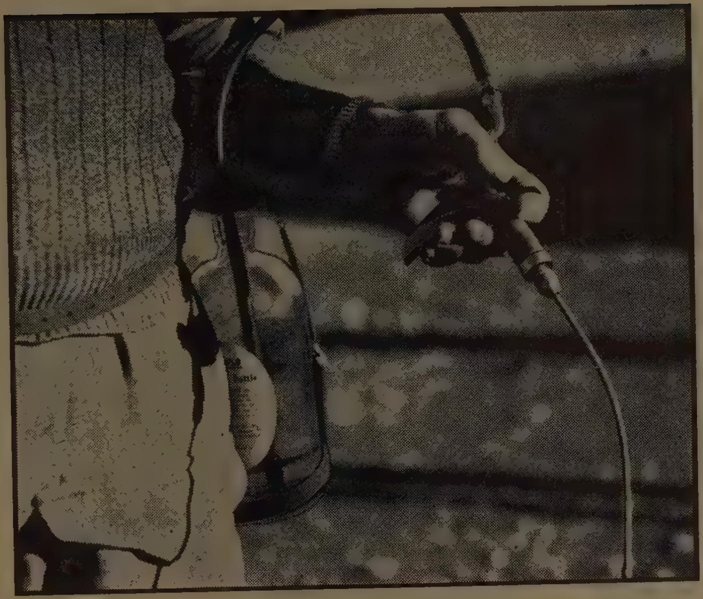

It pays to dose all young pullets with carbon tetrachloride as a routine measure. Where a large number of birds has to be handled an automatic drenching gun such as that shown is worth while.

fected with coccidiosis, put the chicks into it so that they get a good dose of infection, and then, after 3 days, treat them with the drug so that the infection is overcome and they remain solidly immune for the rest of their lives.

It is not really desirable to lean too heavily on sulpha drugs to the complete exclusion of hygienic measures. How then can hygienic measures best be applied for the control of coccidiosis?

The life cycle of the parasite starts with the oocyst, the form which is passed out in the droppings. If this is immediately swallowed by another susceptible chicken, it will not produce coccidiosis; it must first undergo development on the floor or the ground, and the shortest time in which this development can take place under the most favourable conditions is 48 hours.

This, then, is an indication of a means of prevention. If all droppings in a brooder can be removed every 24 hours, the chickens will be unable to reinfect themselves and each other through their own excreta.

This of course is impracticable under ordinary conditions of commercial rearing. It is therefore necessary to see that there are not too many droppings left about; that there is not too heavy a concentration of infection. To this end, the system of wire frames beneath the brooders, with chaff underneath, is a good means of hygienic prevention of infection, the chaff beneath the frames being gradually removed. Remember also that coccidiosis infection develops most rapidly under damp conditions, so that the floor or the litter should not be allowed to get damp. Infection is particularly liable to be on the floor around drinking vessels.

Parasitic Worms

The only worm parasite of any importance in New Zealand poultry is *Ascaridia gallinae*, the common roundworm, which is white or whitish, up to about 2in. long, smooth and unsegmented, and found in the first part of the small intestine; that is, in the part of the gut found immediately after the gizzard. The smaller caecal worm found in the blind gut or caeca does not appear to be of great importance.

The sexes are separate in the poultry roundworm. Each worm is either male or female, not hermaphrodite, as in certain other low forms of animal life. The adult worms live and feed in the small intestine, where the female lays enormous numbers of fertile eggs, which are passed out in the droppings. They do not hatch inside the intestine, but must first reach the outside. Moreover, they cannot infect without first undergoing a stage of development which takes several days. The time which this development takes varies according to internal conditions. It is quicker in a warm, moist environment.

Poultry cannot be shielded completely from roundworm infection. The same is true of a lot of other poultry diseases. All that can be done is to prevent infection from being so concentrated that it sets up a heavy worm burden in the affected stock.

The heavier poultry ranges are stocked, the more infection per unit of area there will be for the birds to pick up. Therefore birds should not be overcrowded during the rearing stage if heavy roundworm infestation is to be avoided.

Poultry become naturally resistant to roundworms as they grow older. The most susceptible age is up to about 5 months. If they can be kept clear until then, there should not be much trouble afterward. Good feeding during the growing stage is important in keeping roundworms down.

The best treatment is to dose the birds with carbon tetrachloride in amounts of 1½ c.c. at 3 months and 2 c.c. at 5 months. It pays to do this

Permanent fowl runs, as on farms or in gardens, can quickly become infected with tuberculosis from droppings. Land which is found to be contaminated should be spelled for at least a year and kept clear of pigs, poultry, and cattle.

Overcrowding in houses such as that shown is a potent source of disease among poultry. [*Niederer*

as a routine measure with all chickens every year, whether they show any symptoms of worms or not.

Pullorum Disease

As a result of the blood testing which has been carried out by the Poultry Instructors of the Department in recent years pullorum disease is no longer widespread. Only a few outbreaks in chicks are recorded each season, generally in stock from a breeder whose birds have not been blood tested.

Any outbreak of disease with deaths in young chicks should lead one to suspect pullorum. If a dozen or so dead chicks are sent to the nearest Poultry Instructor or Veterinarian of the Department of Agriculture, it is generally possible to determine quite quickly whether or not pullorum is the cause. If the carcasses are opened up, small, pin-head sized abscesses are often seen in the lungs and heart, and the matter can generally be put beyond doubt by air mailing the remainder of the chicks unopened to the Department of Agriculture's Wallaceville Animal Research Station for laboratory examination. In urgent conditions like pullorum the result of the investigation is notified from Wallaceville by telegram.

In an outbreak of pullorum deaths generally occur among chicks from the day-old stage and cease when they reach the age of 3 weeks. By that time over 60 per cent. of the chicks may have died, and the survivors, though themselves immune, may be carriers and lay infected eggs if used for breeding later.

It is doubtful whether treatment of affected chicks is desirable. Certainly it should not be undertaken with a view to the subsequent use of the survivors for breeding. There is much to be said for destroying the entire batch in which an outbreak occurs.

If treatment is undertaken, the most effective measure is to dose the chicks with 0.2 per cent. of sulphamezathine in the drinking water for 5 days running.

Of course a great deal of pullorum infection is spread in the incubator after hatching and so it is very important to clean out the batches well after each hatch and fumigate the incubator with formalin. All shells, fluff, and other debris should be burnt.

Tuberculosis

Tuberculosis in poultry is not a disease of the respiratory organs, as in people and cattle, but purely a disease of the digestive organs. In the carcass of a tuberculous fowl large numbers of small yellow spots or patches can be seen all over the surface of the liver, each of which is a focus of tuberculous infection, having come there from the intestines. Closer investigation will reveal small nodules along the course of the intestines. These are the points where the infection gained entry. The disease causes affected fowls to waste away and die.

Before dying, however, a tuberculous fowl will first scatter infection all over the ground in its droppings and this infection will be picked up by other birds.

Permanent fowl runs, as on farms or in gardens, can thus quickly become heavily infected with tuberculosis. As long as poultry continue to occupy them the infection will remain. The only way to eliminate the disease from a flock is to arrange for a veterinary surgeon to tuberculin test all the birds, to kill reactors and burn or bury the carcasses deeply, and to remove the survivors to clean ground which preferably has not carried poultry before, or at least for a year. The contaminated land should then be spelled for a year, during which it should be kept clear of poultry, pigs, and cattle.

Prevention Best

The old adage "prevention is better than cure" is never truer than when used with reference to poultry diseases. A hen should either be well or dead. There is hardly any middle course for individual fowls, as generally it does not pay to treat them.

Sulpha drugs should not be relied on for disease prevention to the exclusion of good hygienic methods. They are expensive and, if overdone, poisonous. Their continuous and indiscriminate use may also lead to the development of strains of disease-producing organisms which may be resistant to their action.

The two facts that most poultry diseases are spread by the droppings and that many "ground" infections live longer under warm, moist conditions indicate two simple lines on which to work in disease control. Birds should not be overcrowded in brooders, rearing paddocks, or laying houses, and floors, paddocks, or litter must not be allowed to become damp.

Drinking vessels should be arranged so that they are not continually surrounded by puddles. There should be no puddles or muddy places on the range. The ground used should be level and well drained if possible; if not, it may be better to rear chickens indoors. Litter in laying houses should be of adequate depth and should be put in sufficiently early in the season not to become damp. Each adult bird should be allowed at least 4 sq. ft. of floor space.

Incubator hygiene is most important. The hatching compartment should be cleaned after each batch, with a vacuum cleaner if possible, the trays scrubbed with hot 4 per cent. washing soda solution, all hatching debris burnt, and the incubator fumigated frequently during the hatching season.

Light Land Subterranean Clover Pastures

IN Canterbury pasture established on light land where rainfall is low or where the initial fertility is not sufficiently high to carry white clover has in the past presented a problem, as establishment depends on establishing a clover which will persist in the sward. Subterranean clover is the only clover which will produce and persist in the sward under these conditions. Its special value on these light, dry soils is its ability to re-establish itself each year from seed. Here R. G. Jolly, Fields Instructor, Department of Agriculture, Christchurch, advises on mixtures and establishment and management methods which will give the best results on light land.

On the shallow, stony soils of Canterbury the moisture holding capacity is often too low for white clover to survive a dry summer. On such soils subterranean clover is the most valuable pasture legume.

THE most critical stage for any pasture where subterranean clover has been sown is during the first year, and management should be directed to ensure that the stand is given every encouragement to flower and set seed. If the pasture is being grazed, stock should be removed from the time of flowering until the seed has set. When a good setting of seed has been obtained the life of the stand is usually assured and it will persist almost indefinitely. Because of the early and rapid growth of subterranean clover the carrying capacity of a pasture is increased, with a consequent increase in soil fertility, which eventually enables a dominant subterranean clover sward to be maintained in which white clover will grow in favourable seasons.

Pasture Mixtures

Subterranean clover has been grown in association with many grasses in simple as well as in general mixtures. The most common seed mixture consists of perennial ryegrass, subterranean clover, red clover, and a little white clover. The white clover may be poor in the initial stages, but adds to the production of the sward when the fertility is built up or in those years during the building up process when weather is favourable to the growth of white clover. For these reasons white clover is worth including in any pasture mixture containing subterranean clover. A suitable mixture for a standard ryegrass pasture is:—

	Lb. per acre
Perennial ryegrass	25
Montgomery red clover ..	3
White clover	1
Subterranean clover ..	4
Crested dogstail	1
	34

In many of the seed mixtures the quantity of perennial ryegrass is reduced to 15lb., and 10lb. of short-rotation ryegrass is added. The short-rotation ryegrass produces feed more quickly than the perennial ryegrass, is a better winter grower, and comes away earlier in spring. On old areas where subterranean clover has been previously grown the seeding rate may be reduced to 1lb. to 2lb. per acre, as seed will already be present in the soil. In most seed mixtures crested dogstail is also worth including. It makes early spring growth and also fills up the spaces left by dead ryegrass plants, giving that density of sward which is so desirable.

To prolong the grazing period in late summer and early autumn, when the ryegrass and subterranean clover normally dry off, some of the more drought resistant grasses such as cocksfoot and *Phalaris tuberosa* may be included in the seed mixture. When these grasses are included the seeding rate of the more vigorous ryegrasses should be reduced to avoid competition. The seeding rate of ryegrass should be reduced to 10lb. to 15lb. per acre and 6lb. to 8lb. per acre of cocksfoot or phalaris should be included. Stocking should not be heavy in the early stages of establishment.

When cocksfoot and phalaris are included in general seed mixtures containing ryegrass the tendency is to manage the pasture according to the ryegrass growth. Cocksfoot and

Grass-grub can be controlled for 3 years with 2lb. of p.p.i. D.D.T. per acre. The light areas shown here received no D.D.T.

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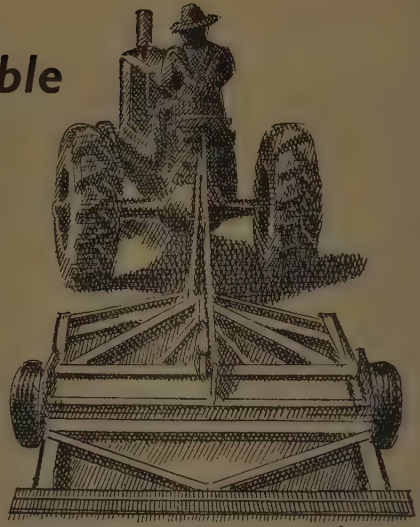

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phalaris are slow in establishing and do not stand the hard grazing that ryegrass does and tend to be eaten out. To encourage the cocksfoot and phalaris, young pastures especially should be given light, quick grazings with large numbers of stock. Under this type of management selective grazing does not occur to the same extent and the young cocksfoot and phalaris plants can become well established. After the first year grazing can be harder, but not so severe that the crowns of the plants are damaged.

Influence of Management

In a mixed sward of grasses and clovers the increase or decrease of many species may be influenced by management. If it is desired to encourage a species, management should aim at allowing it to develop its normal growth habit. That is, tall growing plants should be spelled during their period of maximum growth. Shorter growing or later maturing plants are able to stand grazing harder and earlier in the season.

If it is desired to reduce the amount of any tall growing plant, it should be discouraged from making its maximum growth.

If a pasture is shut up in spring and a hay crop taken in late November or early December, cocksfoot and phalaris may be encouraged in the pasture. When the pasture is cut for hay the ryegrass is checked and the cocksfoot and phalaris come away at the time they are making full growth. To keep a well-balanced pasture overgrazing at the expense of any one species should be avoided.

Special Purpose Pastures

A practice which is gaining favour is the growing of special purpose pastures where the slower growing cocksfoot and *Phalaris tuberosa* are grown in association with subterranean and other clovers or lucerne. Establishment and management of these slower growing grasses under the special purpose type of pasture is easier than when they are included in a general mixture. Their main purpose is to act as insurance against dry periods, and if shut up early enough they will provide a bite of green feed when most needed.

Two mixtures which have given good results are:—

Pastures containing subterranean clover should be spelled during their first summer to allow the clover to set seed. A large amount of seed in the soil ensures the perpetuation of this valuable plant.

1. Lucerne, 12lb., and cocksfoot, 3lb.
2. Lucerne, 12lb., and *Phalaris tuberosa*, 4lb.

Some farmers have included subterranean clover in these mixtures, but owing to the extra competition from the subterranean clover the lucerne dies out quicker than when grown with cocksfoot or phalaris alone.

Cocksfoot is valuable in light land pastures, and when grown in association with subterranean, red, and white clovers gives a good, dense sward. A successful mixture is:—

	Lb. per acre
Cocksfoot	8-10
Montgomery red clover ..	3
Subterranean clover ..	3-4
White clover	1-2
Crested dogstail	1

Establishment

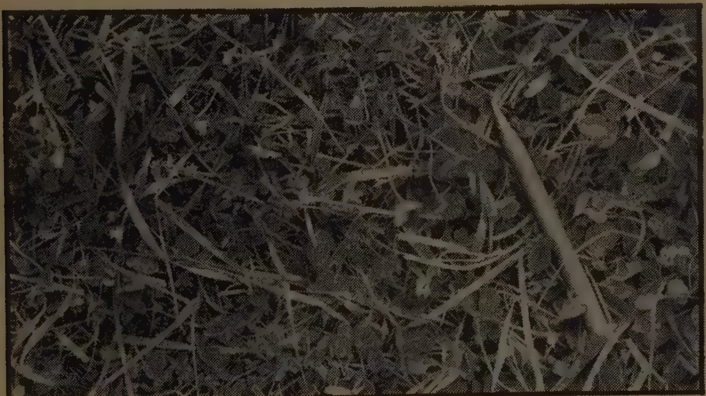
There are several ways of establishing subterranean clover and all have been successful. Stands have been established under cereals, under fodder crops, in straight pasture sowings, and by surface introduction into run-out pastures. The main disadvantage of establishing with autumn sown cereals is that if sowing is too late, there is a risk of frost lift. Also grasses do not establish well under cereals. Sowing with turnips or rape is quite satisfactory provided sowing is not too early. If sowing is done before late November, there is risk of a late autumn flowering, which may be damaged by frost. When sown under rape some of the young plants are trodden out by stock, but this disadvantage is more than offset by the fertility the plants receive from the stock droppings. The most favoured practice is to sow to pasture in January or February after a summer fallow following greenfeed.

The saving of the area for ryegrass seed is recommended, because it not only gives a cash return but also allows the area to be spelled during the flowering and seeding stage, a practice which is essential to a first year stand of subterranean clover. On light land it is better to drill the seed than to broadcast it. When the seed is drilled establishment is quicker and better. Use of the 3½in. coulter is recommended, because it gives a better distribution of seed over the area than does the 7in. coulter, the different species in the pasture mixture have a better opportunity to develop, and pastures tend to thicken up much more quickly.

Like all legumes subterranean clover responds to lime and superphosphate and the application of 1 ton of lime per acre before sowing and 1cwt. of superphosphate per acre at sowing is recommended. Experiments have shown that annual applications of 1cwt. of superphosphate per acre with further lime according to requirements are essential to maintain a vigorous stand of subterranean clover.

Two of the greatest destroyers of light land pastures are grass-grub and porina (*Oxycanus*) and all pastures should be treated with D.D.T. to control these pests. Topdressing a pasture with 2lb. per acre of 100 per cent. p.p.i. D.D.T. per acre will give control for 3 years.

Subterranean clover is the chief fertility builder on light land and provided it is given every chance to survive and flourish, it will give the foundation of good pastures.



A pasture mixture sometimes used in districts which have a dry summer is perennial ryegrass, *Phalaris tuberosa*, white clover, and subterranean clover.

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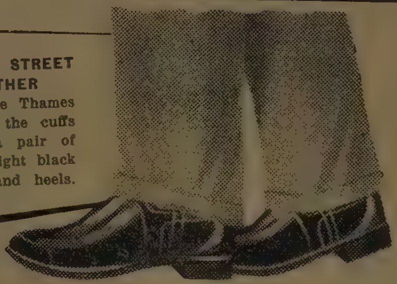

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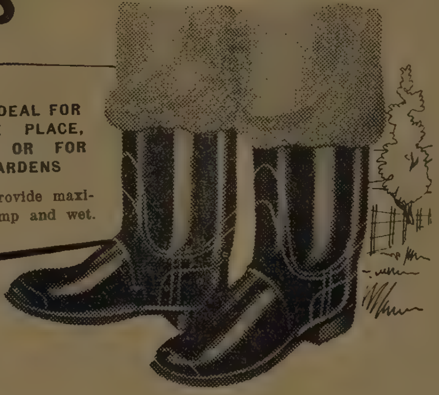

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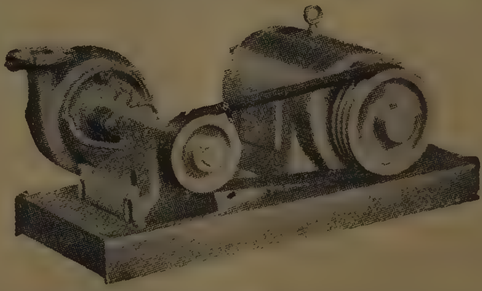

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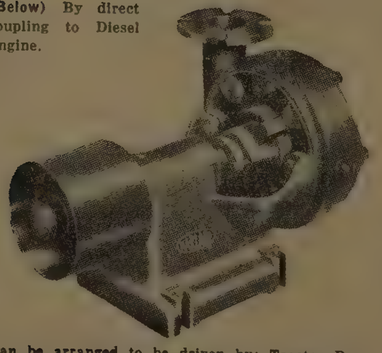

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New Zealand Pig Production and the Export Market

AN increase in pig production in New Zealand means an increase in the export of pig meat. In this article I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington, discusses some aspects of the prospects of increased exports.

["*Farmer and Stock-Breeder*"

The carcass quality of the best examples of the leading English breeds of pigs is excellent: Histon Mollington Marshal, supreme champion Large White at the Royal Show, Windsor, 1954.

PRODUCTION of pig meat can be increased more quickly than almost any other avenue of primary production. It is no exaggeration to say that New Zealand pig production could easily be doubled simply by using the present supply of food for pigs more efficiently and by using all of it instead of allowing large quantities to be wasted. It appears that in the immediate future economic factors, such as the price obtainable for dairy products, might very easily cause a considerable increase in pig production.

This increase would of course have to be exported and the principal outlet would be the United Kingdom. The situation there has changed completely during the last 12 months. Meat rationing ceased at the end of June and the bulk-purchase agreements between the United Kingdom and New Zealand Governments ended at the close of the 1953-54 meat export season. Marketing of meat is free and uncontrolled and once more in the hands of private traders.

Quite naturally after 15 years of control there was at first some confusion and the market was very accurately described as "bumpy". Prices fluctuated a good deal at first, but the buying public, who are the final judges, soon showed where their preference lay in regard to the quality and type of meat they wished to buy.

Keen Demand for Light Porkers

The effect of this with pig meat was a preference for the light porker (60lb. to 80lb. carcass weight), which since the return of free marketing has consistently obtained a premium of up to 6d. a pound over the heavy porker which was in general supply from local sources. Very little pork had been obtainable for many years, what was available being mainly baconer carcasses surplus to the requirements of the United Kingdom bacon curing industry.

The writer recently returned from a visit to Britain and while there found through conversation with butchers, particularly in the London and southern areas of the country, that the memory of the New Zealand porker exported before 1939 was still very green among the trade. Its reputation was as high as ever and in fact even higher, a distant memory lending enchantment to the view. The one complaint was that there had never been enough of this type of porker, and hopes were expressed that they would appear on the market again in far larger quantities than before. It appears that a good market exists for light porkers and that to take full advantage of this, increased quantities should be produced so that regular shipments can be maintained.

["*Farmer and Stock-Breeder*"

Halesfarm Eastern Belle 7th, champion Large White sow at the 1954 Royal Show, Windsor.

Baconer Position

The picture with baconer carcasses is very different. Pig production in the United Kingdom has increased enormously during the last 10 years and the whole of this production has been in the form of baconers; so much so that the bacon curing industry has been unable to handle all the baconers offering and up to the end of meat rationing and the control of the meat industry, numbers of these baconer carcasses were being used as fresh pork. Owing to their size and weight they were not popular with either butchers or their customers.

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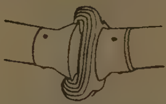

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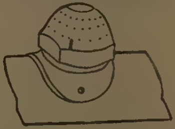

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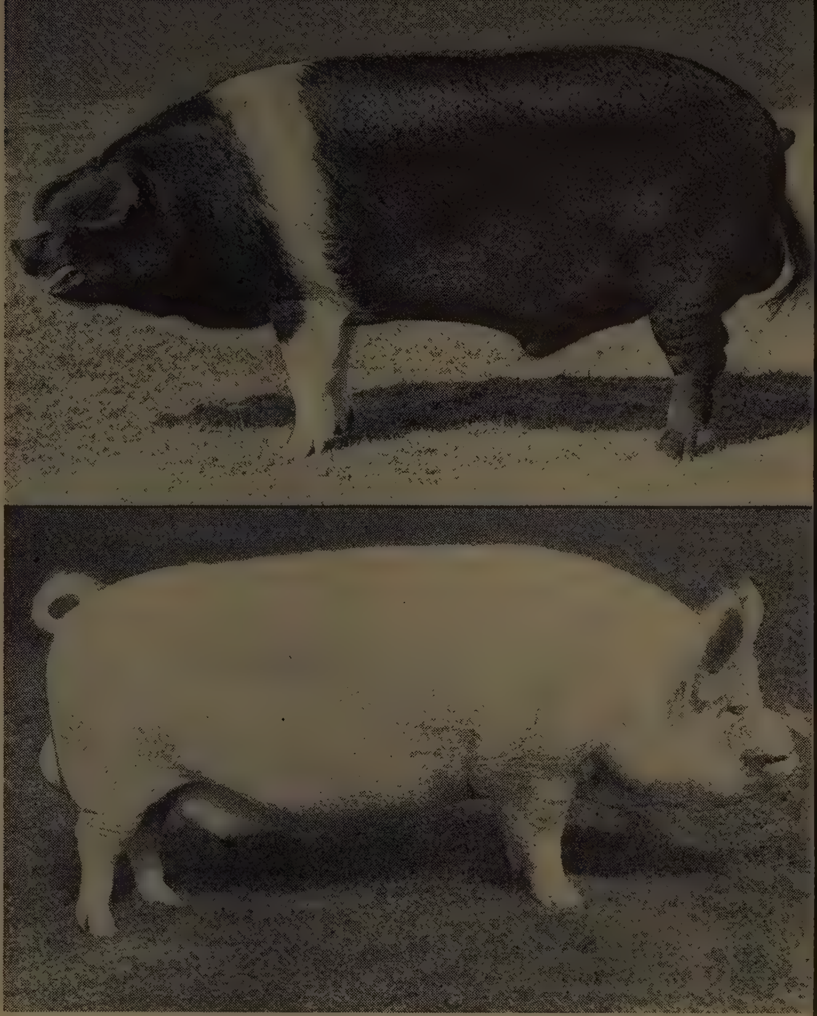
37—PIG PRODUCTION . . .

New Zealand has always exported frozen baconer carcasses which were cured into bacon in the United Kingdom. Before 1939 this suited the bacon curing industry quite well, as this bacon could truthfully be sold as home-cured. At that time there was no over-supply of locally produced bacon pigs. It is quite clear that at present the prospects for the export of baconer carcasses are not good, but as there is a shortage of bacon pigs on the New Zealand market (curers having great difficulty in obtaining sufficient supplies), there is no cause for worry about the profitable disposal of the baconers that the industry must produce if it is to make the best use of the dairy by-products available.

To what extent United Kingdom pig producers will switch to light pork production remains to be seen. Possibly there may not be the inducement to make much change, as they are receiving a by no means inconsiderable subsidy from the Government on their present output. This subsidy, which works on a rather complicated sliding scale tied to both the average weekly price of fat pigs at some 53 markets throughout the country and to the price ruling for feeding meals, has the effect of making the producer less sensitive than he normally would be to fluctuations in the price of his products. He is less inclined therefore to indulge in a major change in his production policy. However, judged by past experience, the New Zealand porker has little to fear from competition from this or any other quarter, provided, of course, that due attention is paid to producing a quality article of the type that the market requires.



[*"Farmer and Stock-Breeder"*

Supreme champions at the 1954 Royal Show, Windsor: Upper—Brilson Frivolity 40th (Wessex Saddleback). Lower—Histon Woodlands Prince 5th (Middle White).

Quality of U.K. Pigs

During the long period of Government purchase of all pigs in the United Kingdom, during which grading standards were relaxed, the tendency to produce overfat and overweight pigs was very much the same as that in New Zealand during the war and immediate post-war years. With the cessation of meat rationing, however, revised grading standards came into operation. These provide a large differential in price between first and second grades and this will undoubtedly have the desired effect in improving carcass quality in all respects in which management and feeding have a bearing.

On points of carcass quality in which breeding is the deciding factor the best examples in Great Britain are equal, if not superior, to anything in the world. This applies particularly to the two most popular breeds, the Large White and the Wessex Saddleback; prizewinning animals of both these breeds exhibited at shows are of excellent quality, as the accompanying illustrations show. There is, however, in the general run of production throughout the United Kingdom a complete lack of that uniformity of carcass quality in which the Danish producer excels. In fact this lack of uniformity is very similar to that existing in New Zealand.

The only scheme in general operation to improve the level of quality of pigs in Britain is what is known as "The Premium Boar Scheme". Under this scheme a group of farmers can obtain financial assistance for the purchase of a boar that has been approved by the local agricultural advisory officer. As the approval is based on external characteristics judged by eye appraisal, it is doubtful if this scheme will have very far-reaching benefits. To date the general improvement has not been great. Progeny testing schemes for pedigree stock are just beginning to be established, but it will probably be a considerable time before they begin to influence the general quality of production substantially.

Prospects

In New Zealand the National Hybrid Sow Scheme, which was described in last month's issue of the "Journal", is likely to make a very decided impression on the quality of production in future if it receives the support from producers that it deserves. It must be coupled with a general improvement in management to be really effective. In this aspect of pig production the United Kingdom farmer is considerably ahead of the New Zealand producer, far more care and attention being given to pigs, particularly sows and litters, in Britain than is customary here. This is not done by means of elaborate housing and equipment but by straight-out care and attention, and despite the more difficult labour situation here, the majority of pig producers in New Zealand could profitably take a lesson from British practice.

Prospects for expansion of pig production from New Zealand in the export market appear to be good for light porkers, but not as good for baconers, though the local market is quite capable of using all baconers provided today, and with rapid increase in population should continue to do so. The essential thing is to produce really high-quality carcasses for both markets. It has been proved conclusively that the best of New Zealand's breeding stock is capable of doing this. The problem is to multiply this stock and ensure that management is of a standard that enables pigs of the desired types to be reared.

LAND DEVELOPMENT, MOUTERE HILLS

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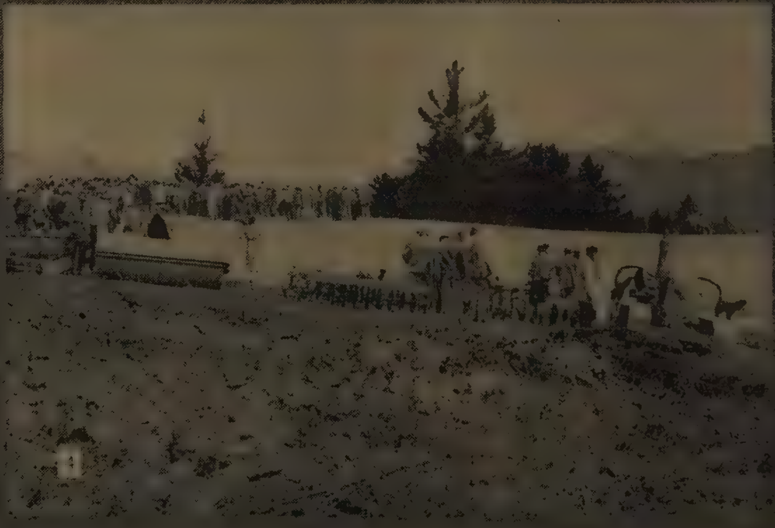
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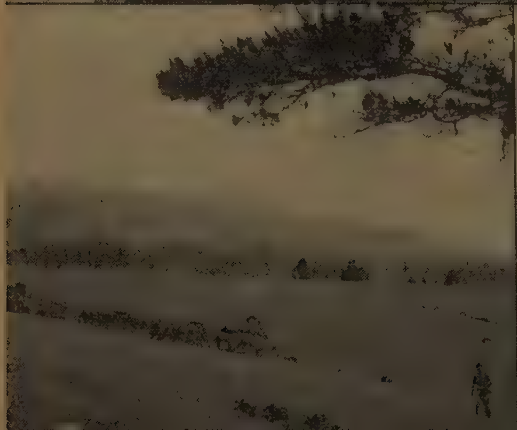
1—Arrival of conference members for the field day at Mr. C. F. Shuttleworth's property, 88 Valley, Wakefield. 2—Mr. Shuttleworth (left) and the conference president, Mr. G. A. Holmes. 3—Professor A. W. Hudson: "The same principles of land development, with modifications, from North Cape to Bluff." 4—In foreground, land under development; the machinery used, and beyond, pasture out of ryecorn. 5—"Grass where there was scrub and manuka before." 6—Miracle worked by the use of lime, phosphate, and good seed.



Grassland Conference in Nelson

By G. J. NEALE, Editor

THE 16th annual conference of the New Zealand Grassland Association held in Nelson in November confounded fairly widespread misgivings about the selection of that district for the meeting. The conference was a complete success in regard to the numbers and the wide basis of representation of the attendance; and those who may have thought that the district was progressive only in regard to horticultural produce were able to see during the field day and to learn from some of the papers delivered that during the last few years some land improvers have started to develop the resources of the district, particularly in the problem area of the Moutere Hills, in a way that foreshadows an increasing contribution to the country's grassland production.

A RESUME of the present production of Nelson by the mayor of Nelson, Mr. J. A. Harley, in his official welcome to the conference referred to £1700 gross value of horticultural produce being taken in a year off 1 acre in the city; he said the district could grow oranges and grapefruit and "darned good hops", 618 acres being in that crop and 4400 acres in tobacco. There were 3000 acres in fruit trees, 25,000 acres in Government forest, 28,000 to 29,000 acres in privately owned forest, and a million board feet of timber were being exported annually to Australia. The district was producing 3000 tons of butter a year.

That a mayor of Nelson welcoming a future Grassland Conference to his district might have more to say about meat, wool, and dairy produce was indicated by Mr. G. P. Dixon, welcoming delegates on behalf of the local provincial Federated Farmers, who referred to the intense interest among Nelson farmers in improving grassland. "The Moutere Hills until recently have been left severely alone", he said, "as it was considered they would hardly grow scrub. With modern knowledge and machinery, however, we have been able to make quite a good show". The Soil Conservation and Rivers Control Council had taken over an area in the Moutere Hills and would show what could be done by soil and moisture conservation methods.

Early work by the Cawthron Institute in surveying the geology and soils of the district formed the basis of an introductory paper to the conference by Sir Theodore Rigg, Director of the Institute, who referred to the many interesting deficiency problems presented, particularly by the Moutere gravels. He felt certain research workers had not come to the end of them yet.

Sir Theodore Rigg (right), Director of the Cawthron Institute, and Mr. H. F. Palmer, a Waimea West farmer, at the field day on Mr. C. F. Shuttleworth's property in the Moutere Hills. Sir Theodore gave a paper on the soils of Nelson and was host for a post-conference visit to the Institute.

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Farm Visit in Moutere Hills

Development work possible on the 300,000 to 400,000 acres of the Moutere gravels was demonstrated to the conference on the property of Mr. C. F. Shuttleworth, 88 Valley, Wakefield, about 19 miles up the Waimea Valley from Nelson. In introductory remarks typical of the vigorous approach of land improvers throughout the country, Mr. Shuttleworth explained that where it was grazeable the Moutere country in its natural state carried about 1 ewe to 4 acres, running them badly at that, with about 4lb. of wool.

Bringing in Moutere Country

"We started operations on this property just over 3 years ago", he said. "We were anxious to get grass to grow where there was scrub and manuka before. The scientists can tell us pretty readily the requirements in manures. The plant breeders have made available good strains of pasture plants.

"We have given up the swamp plough and are relying on discing. We apply up to 2 tons of lime per acre with the grass sowing and 3 to 5cwt. of superphosphate. The seeds mixture is 1 to 1½ bushels of perennial ryegrass, 5lb. of short-rotation ryegrass, a bit of cocksfoot and dogstail, and 6 to 8lb. of clovers (white, subterranean, and red).

"We are keen on ryecorn as a crop preparatory to grass. It helps to hold the soil within a week or two of sowing. It works in very well, as we can put a number of sheep on it, take them off, and it recovers very rapidly. It is also better than a root crop in that it never leaves the ground bare.

"A disadvantage with sowing straight from discing is that the number of gorse seedlings striking is high and they are hard to get rid of. There is no doubt that with the swamp plough you do get rid of gorse. I don't think with discing you can get rid of gorse if the area is sown straight in. If there is no gorse, then it would be foolish not to put the ground straight into grass, as there must be some fertility there that the grass might just as well have as the ryecorn".

Moisture Conservation

Some of the area when originally worked up rilled badly after heavy rain. D. R. Wilkie, district soil conservator, discussed the method of contouring and sowing broadcast in the general line of the furrows, spaced at 8ft. vertical intervals, to make available the maximum moisture. Furrowing was done with the grader and plough. Originally level absorption banks were used and they were quite successful, but in some areas level banks were inclined to fill up and scour. Graded banks had such a slight slope that excess rain drained off and in normal circumstances they absorbed all the moisture available.

Extremely Sour Country

That Mr. Shuttleworth's development work was really the second attempt to bring the country in was explained by D. M. E. Merry, until recently the Department of Agriculture's Instructor in Nelson. The country was originally covered in beech forest which was felled and burnt and English grasses sown. They went out very early and native species took over. The area was extremely sour. The pH of untreated soil was 5.1 to 5.3. Calcium, potash, and phosphate levels were extremely low. The country was completely devoid of clovers. In the early years the Cawthron Institute established a number of trials. Stock did very poorly, bone structure was light, the wool poor, and there was high mortality. The two essentials of lime and phosphate plus good seed had worked miracles.

In the past 16 or 17 years a large number of manurial and strains trials had been carried out. It became fairly apparent that if phosphate only were used, the results were very poor. Liming at 1 ton per acre was insufficient; more was needed to get successful pastures. The most successful plot in trials had 2 tons of lime and 3cwt. of phosphate per acre. Molybdenum at 2½oz. per acre was giving good results, particularly where liming had not been at heavy rates.

"We have tried potash, but it does not appear to give the results that superphosphate does. Lime and superphosphate and molybdenum will work miracles. Perhaps in the past in breaking in this country too light dressings of lime and superphosphate have been used. It seems to need massive applications. If clovers do not strike, ryegrasses will go out quickly and browntop and native species come in.

"The copper status is low too. In time to come it might be advisable to use copper too. It is essential to use borax in association with lime and superphosphate if a swede or turnip crop is being taken."

Possibilities of Oversowing

Plot trials on the Shuttleworth property that were part of a series established on the Moutere gravels to determine the likely results from the surface sowing of clovers were discussed by F. E. T. Suckling, Grasslands Division, Department of Scientific and Industrial Research. Clovers had struck where there was enough moisture.

"The plots have shown", he said, "that provided lime, potash, and phosphate are applied in ample quantities you will get results. We have been trying to show results with low quantities of lime and molybdenum. Other trials in the district show this is possible, and also in the North Island, where success is being achieved with low lime applications and molybdenum.

"On country that is discable, the first step in development is to disc, but where it is too steep oversowing can and should be tried."

Aerial Topdressing

The future of aerial topdressing, which was only in its infancy in the district, in the development of the assessed 100,000 acres of farmable hill country in the four counties of Nelson was discussed by R. H. Scott, Land Utilisation Officer of the Department of Agriculture, whose paper on the economics of hill-country development was keenly discussed at the conference. Last autumn about 350 tons of superphosphate was spread by aircraft in Nelson and Golden Bay and about twice this tonnage would be spread next autumn.

"When you look about you from this property and see practically nothing but hill country there certainly seems to be scope for aerial topdressing. However, to do the job is costly. Superphosphate landed on farms in this area costs about £15 per ton and the total cost to get 2cwt. of superphosphate spread per acre would be about £2 2s., inclusive of cost of fertiliser, labour provided by the farmer to assist in loading the aircraft, spreading costs, and any interest on capital in the airstrip or airstrip fee. In the Golden Bay district where superphosphate costs between £16 and £17 per ton at the farmer's gate, the all-in cost of getting 2cwt. spread per acre would be £2 4s. to £2 6s. In North Island districts £1 18s. is considered fairly high, but in spite of these costs there are farmers in Nelson and Golden Bay who consider aerial topdressing and oversowing well worth while."

Liming with the Blower

The cost of applying lime from the air prohibited the use of the aeroplane, and in this country where not only superphosphate but heavy dressings of lime were required a great problem was created, said Mr. R. C. T. Raine, who discussed his land improvement in the Moutere district.

"There is a big area here as in other parts of New Zealand where you cannot take the topdresser. The answer is the blower. It is sometimes thought that the wind is of great assistance in the use of the blower. My opinion is that it is better if there is no wind. On a calm day you can throw the material about a chain. With a tracklaying tractor you can take the machine on to the country and do about 30 acres a day. We find that by using a bulldozer to put in roads—they are in fact only level areas—the use of the blower is assisted tremendously.

"After ploughing in the gorse you get gorse seedlings showing up again for years after. Spraying with 2,4,5-T is effective and 'roads' constructed for use of the blower are also useful for gorse spraying. There is no doubt a place for the blower between the orthodox wheels and the aeroplane. You can sow seed with it too."

Illustrations opposite: 1—D. R. Wilkie: "Room for greater concentration on the problems of sloping land." 2—R. H. Scott: "Possible to develop economically considerable areas of hill country from surplus farm revenue." 3—Dr. J. Melville. 4—C. C. Leitch: "With aggressive clovers you will get fertility." 5—D. M. E. Merry: "Future of thousands of acres of Moutere gravels brighter." 6 (left to right)—S. H. Saxby, retiring secretary to the Association, E. A. Madden, and D. I. Glue, incoming secretary. 7—F. E. T. Suckling: "On country that is too steep oversowing can and should be tried."

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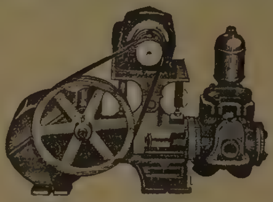

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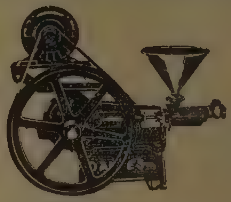

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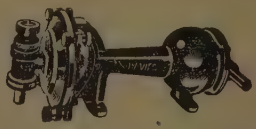

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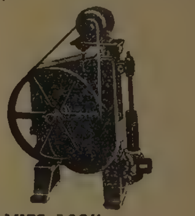

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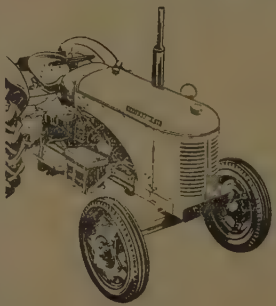

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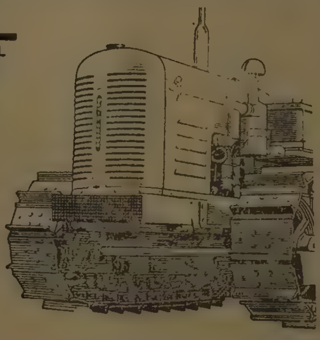

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Less Ryegrass, More Clovers

A willingness to "stick his neck out" with the provocative statement that seeds mixtures in this class of country should err on the side of greater quantities of clovers and less of ryegrass was expressed by C. C. Leitch, Fields Superintendent, Department of Agriculture, Christchurch, in discussing the pastures on the Shuttleworth property.

"On country of this type the ryegrasses tend to become aggressive to the exclusion of the clovers. In these dry conditions this is to some extent evident, though where there is moisture the clover is holding its own. The practical application of general mixtures to particular local conditions is very important. At this stage the cocksfoot that was included in the mixture should be showing up. If you get very quick establishment of ryegrass at fairly heavy rates, the chances are that the clovers are going to have a struggle. Subterranean clover is the pioneer as far as establishment and building up of the nitrogen supply are concerned. I would certainly approve of the inclusion of up to 2lb. per acre. Starting with low fertility, one thing subterranean clover needs is phosphate. If the subterranean clover is inclined to disappear there is nothing wrong with that, as long as other clovers are taking its place.

"I would be inclined to cut the normal 25lb. of ryegrass back to 15lb. If the pasture opens up, other things will come in, it may be true, but if you are applying the fertiliser and lime required, the ingress of other things is not worth worrying about. If you are getting clovers—and aggressive types—then you will get fertility and the results you want."

The application under practical farming conditions of what science had shown to be possible in the development of problem and inferior country had been witnessed during the field day, said Professor A. W. Hudson, in thanking Mr. Shuttleworth for the opportunity given the conference to visit his property. Such development was going on from North Cape to Bluff. It was rather different in the pumice country, but whether it was being done in the North Island or the South Island the same principles, with modifications, were being applied.

Conference Papers

Titles of formal papers and names of speakers are given at right. Those who were already full members or paid full membership (not conference membership) fees at the conference will receive copies of the printed "Proceedings", inclusive of discussions, through the post later in the year. Others requiring copies of the "Proceedings" (price 15s.) should make early application to the Secretary of the New Zealand Grassland Association, c/o Box 2298, Wellington, in time to have their orders included in the quantity to be printed.

Farmers took less part in the presentation of formal papers in this conference than hitherto, but fairly close adherence to the programme allowed full time for their participation in discussions following papers. Mr. John Andrew, Dominion president of Federated Farmers, gave the opening address, and Mr. J. E. V. Simpson, formerly in charge of the Department of Agriculture's Manutuke Research Station but now farming on his own account, gave a joint paper with his successor at the station.

There appeared to be less representation of local farmers than at other recent conferences, where local participation has heavily preponderated, but attendances, which were between 300 and 400, were maintained better throughout the conference, which indicates that the Association has established itself so highly in the regard of a large range of agricultural interests that attendance is considered worth while, even though it entails travelling from Southland or Northland.

For the first time a woman member gave a paper at the conference, and though Miss J. G. Miller, Biometrician of the Department of Agriculture, apologised for the preponderance of statistics in her address, her hope that "figures would be interesting viewed from any angle" prepared a very receptive audience.

Four papers by extension workers on the value of pasture species in South Auckland, Taranaki, Canterbury, and Otago and Southland formed the core of the conference papers, and they were introduced and followed by papers by plant breeding research workers on the functions, environmental requirements, and productive value of new strains.

Farmers appear to be in about the middle of the era of the incorporation of short-rotation ryegrass into pastoral farming practice. Questions involving its establishment and management in differing environments were dealt with in many of the papers and speakers and research workers were called on to answer a number of inquiries from farmers during discussion. The diehards were represented by a Taranaki farmer who, milking 71 cows on 70 acres of perennial ryegrass pastures, declared his motto as "Never go mad about anything". The Dairy Board's consulting officer, while testifying to the efficiency of this farmer's management, was emphatic that he could do even better with short-rotation ryegrass.

Indicative of the range of questions and opinions offered are the following points taken from discussions:—

Irrigation: Have there been experiments on its apparent cooling benefit on the production of some pasture species?

A. The stage of making measurements has not been reached. The benefit from a moist soil surface in reducing surface temperatures comes not so much when there is adequate foliage cover as when the pasture is defoliated, and the sun's rays beat directly on the soil surface. If the surface of a closely grazed pasture is dry, it will heat up more and there will be a far greater death of tillers. At Grasslands close defoliation gave over a 50 per cent. reduction in number of tillers present.

Water Grasses: It seems desirable to pay more attention to their place in New Zealand farming. There is an inclination to treat all classes of land alike. The aim on most low-lying, swampy ground is to drain it and try to turn it into ryegrass-white clover areas. Large amounts are spent on river protection and drainage works which generally require very costly maintenance. In the Mercer area in the upper Waikato there are large areas of water grasses and swamp not much above sea level. It is a natural ponding area for the Waikato and there is practically no drainage off it. The present idea is to

Papers and Speakers

"The Soils of Nelson District", **Sir Theodore Rigg.**

"An Introduction to Farming in Nelson", **D. M. E. Merry** and **R. H. Scott.**

"The Function of Bred Strains in New Zealand Pastures", **L. Corkill.**

"Effects on Pasture Species of Changes in Environment and Management", **K. J. Mitchell.**

"The Value of Various Pasture Species in South Auckland", **J. E. Bell.**

"The Value of Various Pasture Species in Taranaki", **F. L. Knowles.**

"White Clover as a Lamb Fattening Feed", **D. P. Sinclair** and **J. E. V. Simpson.**

"The Value of Various Pasture Species in Canterbury", **C. C. Leitch.**

"The Value of Various Pasture Species in Otago and Southland", **J. P. Lambert.**

"The Importance of Spelling in Increasing Pasture Production", **C. J. Hamblyn.**

Presidential address, **G. A. Holmes.**

"The New Zealand Grassland Association", **S. H. Saxby.**

"The Economic Aspects of Developing Hill Country", **R. H. Scott.**

"The Role of Soil and Water Conservation in Grassland Production", **D. R. Wilkie.**

"Techniques under Study for the Improvement of Tussock Grassland", **J. M. Hercus.**

"The Use of Phosphate on Some Major Waikato Soil Types", **I. L. Elliott** and **J. Karlovsky.**

"The Accuracy of Eye Observation in Pasture Trials", **Miss J. G. Miller.**

"The Chemical Control of Weeds in Pastures", **L. J. Matthews.**

"A Comparison of New Zealand and Imported Strains of Cocksfoot", **L. W. Gorman.**

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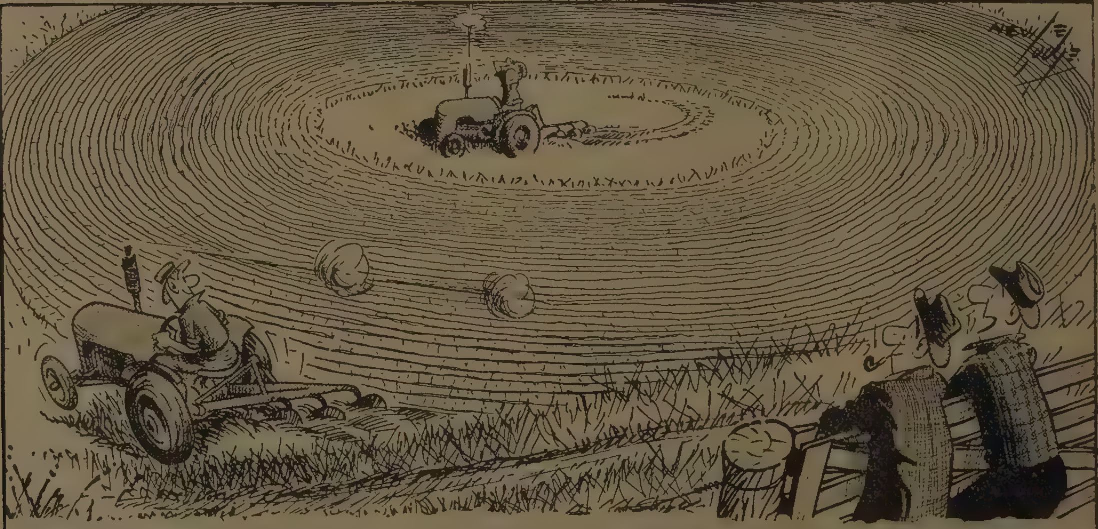

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drain it with a system that will require costly maintenance. The Association could give consideration to water grasses, as it is certain they will have a very important place in pastures in New Zealand.

Paspalum: Would temperatures be sufficient to enable it to play a part in bringing in some of the hard country of Nelson?

A. Much of Nelson is too cold in winter, but paspalum will grow round the coast.

Paspalum: Is there any place for improving the type in New Zealand?

A. In South Auckland the area sown in paspalum is small, but in North Auckland, where large areas are being developed by the State, sowings of paspalum are large and if a superior strain could be produced rapidly enough, there would be a use for it, but Grasslands would have to work pretty rapidly. With paspalum the position is not nearly the same as with other strains. Paspalum breeds true and there is not nearly the same chance of variation in plant type. It is very problematic whether much improvement could be made.

Crested Dogstail: Would there be the same difficulty in regard to its breeding true?

A. There are quite wide variations in crested dogstail. Commercial lines

FILM “CARPET OF GRASS”

100 Years of Grass; 50 Years of Improvement

The first showing in New Zealand of the film "Carpet of Grass", a tribute to the work in grassland improvement of Mr. A. H. Cockayne, late Director-General of Agriculture, and Sir Bruce Levy, until recently Director of the Grasslands Division of the Department of Scientific and Industrial Research, was arranged by the New Zealand Grassland Association to take place in Nelson during its 16th conference there. Simultaneously a second copy of the film had its première in Invercargill at the conference of the New Zealand Grain, Seed, and Produce Merchants Federation, who, with New Zealand fertiliser interests, were the joint sponsors of the production of the film by Pacific Film Productions Ltd.

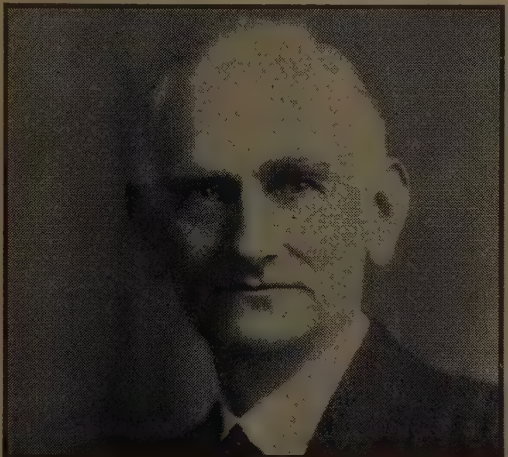
To attempt to show the part played by science in the progress of agricultural research in New Zealand in the past 30 or 40 years and at the same time produce a film with sufficient appeal to general theatre audiences was the difficult task set a committee representing the Grassland Association and the sponsoring interests that undertook responsibility for the film's production.

The 30-minute documentary of grassland progress traverses the stages in the transformation of the country by the co-operation of the plant breeder, the grassland scientist, and the farmer to the present peak of recognition as a foremost grass-farming country of the world.

Mr. Cockayne in 1931 called the meeting at which the New Zealand Grassland Association was formed and he became its first president. Mr. Bruce Levy was president in 1951 and some of the later sequences in the film were photographed at Association conferences at which Sir Bruce is shown propounding with characteristic vigour the principles of grassland improvement that have won him regard and esteem in his own country and abroad.

[*“Evening Post”*

Above—The investiture by the Queen on her recent visit of Sir Bruce Levy in recognition of his services to agriculture. At left below: Mr. A. H. Cockayne.



[*S. P. Andrew*

The requirement of suitability for public showing both here and overseas necessarily limited the extent to which grassland farming and its related sciences could be treated in the film. Mr. T. G. Tyrer, who wrote the script, has provided sequences of Mr. Cockayne in retirement and Sir Bruce at work at Grasslands Division and in retirement that lend a personal interest to the portrayal of the work on which these two men had such a great influence. The film should do much to create public interest in the importance to primary production of co-operation between the research worker and the farmer. It provides for the scientist and the farmer an interesting and at times exciting glimpse back over the way they have come, and it should draw the attention of overseas audiences, particularly in Britain, to the devoted service and outstanding qualities of those who have been responsible for increasing to an astonishing degree over the years the output of livestock products from this country.

A copy of the film is being sent to England to be put on theatre circuits there and 16mm. copies are also available for use in other than public theatres.

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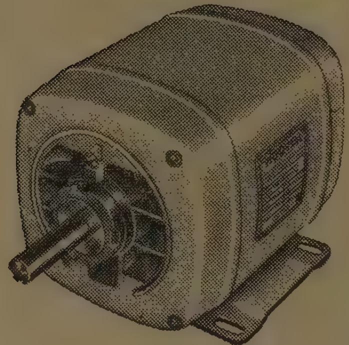

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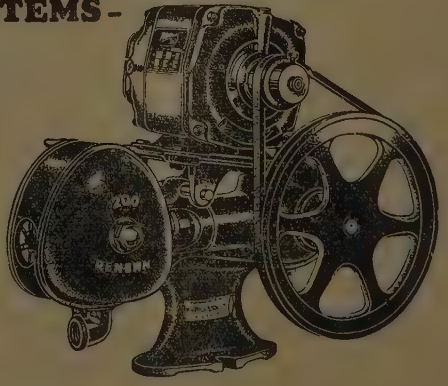

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Conference delegates moving from the conference hall (left background) to a Nelson theatre for the premiere of the film **"Carpet of Grass".**

of dogstail are not the best. The first harvest is not so good as that from a line allowed to grow for a number of years. Seed is best from old pastures and roadsides. The best selection was made from a Kentish line. It is not considered advisable or necessary to take selection further. The trouble is that dogstail is comparatively low producing and even if selection increased its production 20 per cent., it is still not a good grass.

Prairie Grass Sward: Can it be maintained under strip grazing in Taranaki?

A. On one property there have been about 5 acres of prairie grass for about 15 years and it has been strip grazed every year.

Crossing of Short-rotation Ryegrass with Perennial: Would there be a danger of it?

A. If you are going in for perennial ryegrass seed production, I would not recommend your sowing short-rotation, as they cross readily. Short-rotation ryegrass seed also persists in the ground and many perennial ryegrass seed crops have been rejected for certification on areas previously in short-rotation ryegrass swards that have been ploughed up and resown in perennial, even after 5 or 6 years.

Can a Perennial Ryegrass-Short-rotation Ryegrass Pasture be Managed as well as a Pure Sward?

A. If you don't graze perennial ryegrass at the 5 to 6in. stage you won't get cows to eat it readily. Short-rotation ryegrass is very flexible and can be grazed at many heights. Two farmers sowed a mixture of 8lb. of short-rotation and 20lb. of perennial. One hard grazed his pasture and it went to perennial; the other lax grazed his and it went to short-rotation, even with only 8lb. of the short-rotation.

Short-rotation and perennial ryegrass require different management. If we are going to get the most out of short-rotation and one of its most important attributes, its capacity to spread production, then it is best to use a simple mixture. Farmers could have a certain area in simple short-rotation ryegrass mixtures and the rest in general mixtures containing some short-rotation ryegrass.

Meadow Fescue: Has it a place for late autumn grazing?

A. The English use meadow fescue for that purpose; for a hay crop or pasture late in the season. It was not found at Grasslands to be a high producer. Cocksfoot would stand up to tougher conditions and give better production.

Ryegrass Seed: What methods might be used to economise drastically the low supplies?

A. Serious consideration of the question is needed if production is to be increased. Any area that shows promise of seed being available should be grazed until seed heads appear and then shut up. It is a question of whether we can adopt the policy of self-interest or whether we can take the interests of the country as a whole and produce seed. Without seed supplies we are going to be in a serious position. Saving of seed does not necessarily mean reduction in carrying capacity; only a little more thought in management. The Blackmore coulters could be used to introduce seed without cultivation. It is a very quick way of establishing a pasture under the present set-up.

Eczema of Dairy Cows in Early Spring when Ryegrass is Dominant: Has the ryegrass anything to do with it?

A. We have had no evidence of facial eczema of cattle or sheep in spring. Odd instances of the trouble referred to have been brought to our notice, but with the exception of St. John's wort we have not been able to isolate the factor causing it.

Spurrey: How can it be reduced in preparation for oversowing with short-rotation ryegrass and white clover without affecting the oversowing?

A. Once clover is at the 2 to 3 true-leaf stage any phenols such as D.N.B.P. can be used. You have to get the spurrey young.

Buttercup: What can be recommended for its permanent control and what effect will it have on other species in the pasture?

A. Buttercups are so susceptible that the most selective weedkillers such as water-based M.C.P. can be used. Their effect on clover is only very slight. The follow-up depends on the farmer; it depends on his pasture management whether he keeps the buttercup out. Buttercup can be knocked each year as it appears, but pasture improvement after the first treatment is preferable to application of weedkillers year after year.

Officers of Association

Officers elected at the annual meeting during the conference were as follows: President, Dr. J. F. Filmer, Director of the Animal Research Division, Department of Agriculture; vice-president, Dr. J. Melville, Director of the Grasslands Division, Department of Scientific and Industrial Research; immediate past-president, Mr. G. A. Holmes, Superintendent, Invermay Research Station; secretary, Mr. D. I. Glue, Department of Agriculture, Wellington; members of executive committee, Mr. C. J. Hamblyn, Fields Superintendent, Department of Agriculture, Palmerston North, and Professor J. W. Calder, Canterbury Agricultural College, Lincoln.

Dr. Melville is chairman of the organising committee of the 7th International Grassland Congress to be held at Massey Agricultural College, Palmerston North, in November 1956, and his election as vice-president of the Association this year means that he will assume the presidency in the year of the International Congress, when the New Zealand Association will be the host body. The New Zealand Association's meeting in 1956 is to be held in Christchurch after the International Congress in Palmerston North, at which Dr. Melville will probably be the temporary president, and if procedure at previous International Grassland Congresses is followed, he will then be elected to the presidency of the congress.

1955 Conference in Hawkes Bay

It was decided to hold the Association's next conference in Napier or Hastings in the first half of October 1955.

Photographs by Broma Studios and departmental officers.

Control of Spanish Heath

By W. F. LEONARD, Instructor in Agriculture, Department of Agriculture, Blenheim

SPANISH heath (*Erica lusitanica*) has been known in certain parts of New Zealand for many years, but within the last 10 years its aggressive nature has caused it to claim the attention of an increasing number of landholders. The fact that no stock can be induced to eat heath has aided its spread over grazing land where control by cultivation is not possible. In the past the only control measures available on hill country have been afforestation or grubbing, and neither has been practised very widely.

AS most of the country infested with heath is of low productive value, expensive schemes for control have not been put into operation, but the weed is so aggressive that more valuable land may be threatened. Because of this the Department of Agriculture has sought a chemical means of control or eradication and in 1947 trials were laid down with ethyl ester 2,4-D and the sodium salt of M.C.P. weedicides. The M.C.P. preparation had practically no effect on the heath; that treated with 2,4-D, after having the foliage completely browned off, made a full recovery. Repetition of the treatments produced the same results and it was concluded that neither 2,4-D nor M.C.P. would control heath.

Trials with Hormone Weedkillers

The production of the related weed-killing material 2,4,5-T led to intensified efforts toward heath control and in early 1952 trials were established near Picton with the butyl ester and the butoxy ethanol ester of 2,4,5-T and the mixed butoxy ethanol esters of 2,4-D and 2,4,5-T. Each of the three materials was applied at 1lb., 2lb., and 3lb. of acid equivalent per acre, giving nine treatments, and to obtain a complete cover of foliage while using the minimum quantity of water the sprayer was fitted with low-volume nozzles.

After a complete foliage kill on all plots sprayed in autumn a disappointingly large amount of regrowth appeared the following spring from the bases of plants on all 2,4,5-T plots. The regrowth was sprayed in autumn, but even this second application failed to kill all plants, though the number of plants surviving on the 2lb. and 3lb. plots was not very great. On the other hand plots treated with the mixture of 2,4-D and 2,4,5-T gave much better results. A good deal of regrowth appeared on the 1lb. plot, only a moderate amount on the 2lb. plot, and little on the 3lb. plot. All plants on the 2lb. and 3lb. plots were killed when resprayed once, thus showing marked superiority to the pure 2,4,5-T treatments.

The success of the mixture over straight 2,4,5-T treatments suggested that further investigation into the use of 2,4-D might be worth while. Trials were accordingly laid down to test a number of 2,4-D and other closely related materials most of which have become available since the original 2,4-D trials were established in 1947. These trials have not been down long enough to provide any conclusive information on their value in killing heath, but the fact remains that a practicable chemical means of heath control is available to those requiring it.

Complete Spray Cover Essential

Throughout the trials the importance of obtaining a spray cover over all foliage was demonstrated by the survival of any plants or parts of plants where even the tip escaped treatment. This need for complete foliage cover probably accounts for the greater degree of control achieved when the heath sprayed is not above 18in. high. Tall plants could be cut or perhaps burnt and the regrowth sprayed. In an effort to secure more penetration of the spray material into the denser heath plants high-volume nozzles applying about 120 gallons per acre were used on recently established trials. This may give a greater kill at one application and consequently less regrowth the next year, but the method requires much more water than where low-volume nozzles are used and its use would probably be confined to the more accessible infestations.

Competitive Plants Necessary

It should be borne in mind, however, that complete and permanent eradication of heath by spraying alone would be a long-term undertaking. If existing plants are killed, new ones will spring up unless competitive growth from other plants such as pasture species is encouraged. For this reason topdressing trials have been established to determine the quantities and types of fertiliser needed to promote such growth. Preliminary trials have already shown that white clover in particular can be induced to grow quite satisfactorily and it is hoped that before long a workable topdressing programme for such country will be forthcoming. At this stage the application of a number of nutrients including phosphate, calcium, and molybdenum appears likely to play a part in the establishment of a vigorous pasture cover on heath-infested country. If this can be done, not only will the threat to neighbouring land be removed, but valuable grazing will be provided by land now producing virtually nothing.

Part of the trial area near Picton. The sprayed plots, on which Spanish heath has been killed, are in the foreground and the untreated areas are in the background.

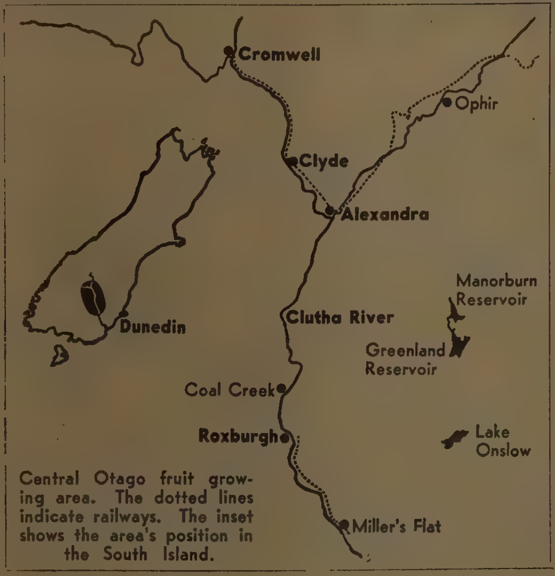
Cherry Growing in Central Otago

CENTRAL Otago is well known for the high-quality stone fruits grown there, among which the cherry is popular. The sweet cherry, *Prunus avium L.*, was one of the first fruits to be grown there, two seedling trees purchased from a "swagger" being reputed to have been among the first trees planted by that pioneer of fruit growing, Joseph Tamblyn, at Coal Creek about 1865. The trees thrived so well that it became the custom to include cherry trees in any later plantings. In the following article W. S. Kemp, Horticultural Instructor, Department of Agriculture, Alexandra, describes cultural methods for sweet cherries.

TODAY the number of trees in the Central Otago district totals considerably more than half the plantings for New Zealand and the percentage of production is even higher, being almost three-quarters of the total for the Dominion.

The sweet cherry is the only type grown commercially and is the earliest of the deciduous tree fruits to ripen. The sour cherry, which is extensively grown in England, Europe, and North America, has never become popular in New Zealand.

The cherry is believed to have originated in Transcaucasia and adjoining areas of Asia Minor and Persia, where the apple, pear, and plum also originated. The earliest report of its cultivation occurs in Greek history about 300 B.C. Pliny mentions 10 varieties being grown about 30 A.D. Since then the number of varieties has steadily increased and Hedrick (in "Cherries of New York", 1915) lists 460 varieties as having been grown in North America.



Central Otago fruit growing area. The dotted lines indicate railways. The inset shows the area's position in the South Island.

[*J. F. Shepherd*

This picker harvesting Florence variety cherries is using the type of picking box most widely used.

Soil and Climate

The cherry tree is most exacting in its soil requirements and will not tolerate heavy, wet soils or dry, sandy ones. It does best on deep, rich, well-drained loams and in Central Otago thrives on the deep alluvial flats and gravelly fans formed by the Clutha River and its tributaries.

Rain at harvesting can have disastrous results on soft fruits such as cherries, and in this respect Central Otago with its dry climate provides better growing conditions than most other districts. Probably because the fruit matures early in the season, before high summer temperatures have depleted soil moisture, the cherry appears to need less water than do most other fruits. It can be grown on non-irrigated areas even where the rainfall amounts to only 20in. annually, provided adequate soil moisture is available up to the time of ripening. As soil moisture in Central Otago is seldom sufficient for successful fruit production and adequate tree growth, irrigation is usually necessary.

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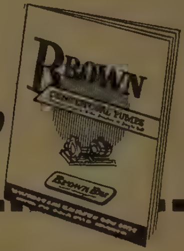

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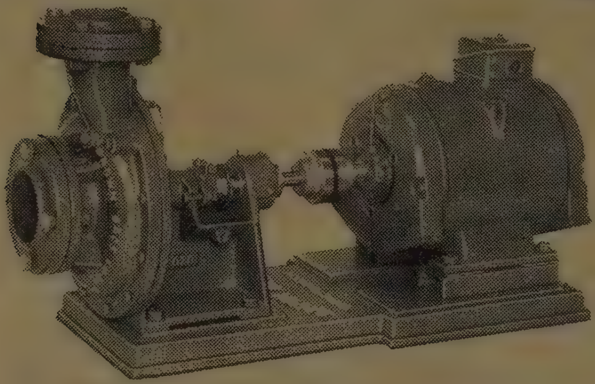

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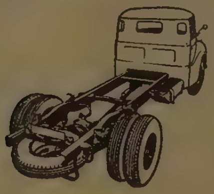

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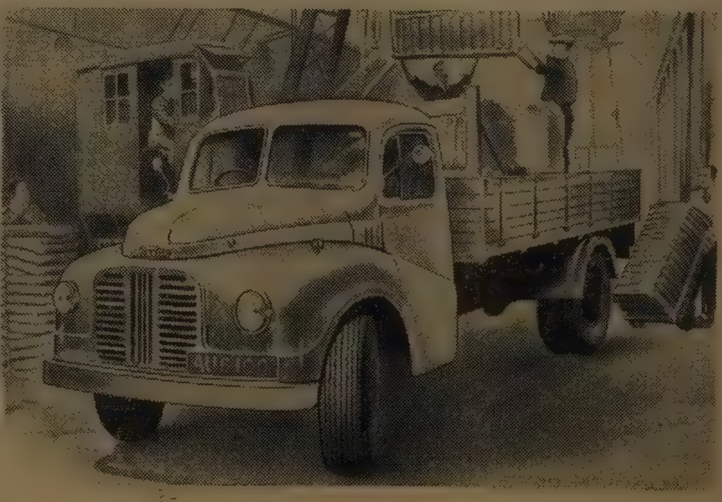

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Choice of Varieties

Though in the Northern Hemisphere a large number of varieties has been grown, locally the earlier growers in particular were limited in their choice to those varieties obtainable from New Zealand and Australian nurseries. Over the years many varieties have been tried, but few have proved to be outstanding under New Zealand conditions. The selection of suitable varieties is therefore somewhat simpler than with most other fruits and the tendency in recent years has been to reduce the number of varieties grown to a minimum consistent with a coverage of the relatively short harvesting period and for ensurance of adequate cross-pollination.

The bulk of the plantings are of late maturing varieties which are usually of firmer texture and better able to stand up to handling and transport than those maturing early. Other factors, such as the public preference for black cherries and the advantage of growing varieties which mature in time to be marketed before the Christmas holidays, also have an influence on new plantings.

A number of growers have relatively large areas of up to 5 acres, but the majority of plantings are comparatively small, the number of trees and range of varieties grown in any one orchard being largely dependent on the amount of labour available to handle the crop in the restricted harvesting period.

The trees in this orchard were planted at 12ft. spacings with a view to eventual netting. The crowded conditions are well illustrated.

Cherries can be classified into a number of groups based on shape, firmness, and the colour of the flesh, or more strictly the colour of the juice, but no system yet evolved is entirely satisfactory, many varieties being intermediate in respect of one or more of the classifications.

The main varieties grown are listed in the table at left in order of ripening.

MAIN VARIETIES OF CHERRIES GROWN IN CENTRAL OTAGO IN ORDER OF RIPENING

Variety	Size	Shape	Firmness	Skin colour	Flesh colour
Early Purple Guigne	Small-medium	Round	Soft	Almost black when ripe	Dark red
Early Lyons	Large	Heart shaped	Soft	Dark red	Dark red
Early Cluster	Medium	Round	Soft	Dark red	Yellowish
Early Rivers	Medium	Obtuse heart shaped	Soft	Dark red	Dark red
Chapman	Medium-large	Heart shaped	Soft	Black	Light red
Werders Early Black	Medium	Heart shaped	Soft	Almost black	Dark red
Bigarreau Twyford	Medium-large	Heart shaped	Soft	Light red	Yellowish
Bedford Prolific	Medium-large	Obtuse heart shaped	Firm	Black	Dark red
Black Tartarian	Large	Obtuse heart shaped	Firm	Almost black	Dark red
White Heart	Medium	Heart shaped	Soft	Light red	Yellowish
Bigarreau Napoleon	Large	Heart shaped	Firm	Dark red	Pale yellow
Bigarreau Pelissier	Large	Heart shaped	Firm	Almost black	Dark red
Dawson	Large	Heart shaped	Firm	Black	Dark red
Florence	Large	Heart shaped	Firm	Red	Yellowish
St. Margaret	Large	Heart shaped	Firm	Almost black	Dark red
Bing	Large	Obtuse heart shaped	Firm	Almost black	Dark red
Williams Favourite	Large	Heart shaped	Firm	Dark red	Yellowish

Propagation

Like most other fruits the cherry does not come true from seed and it is necessary to work the desired scion variety on to a stock. This can be done by either budding in late summer or grafting in spring; both methods are used by nurserymen, though grafting is probably more generally successful.

Rootstock

As many of the trees originally came from nurseries in Australia, most of

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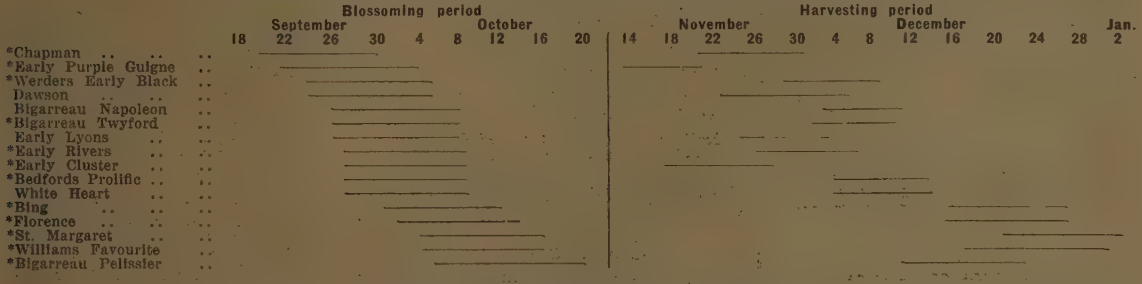

* Denotes those varieties recommended for planting.

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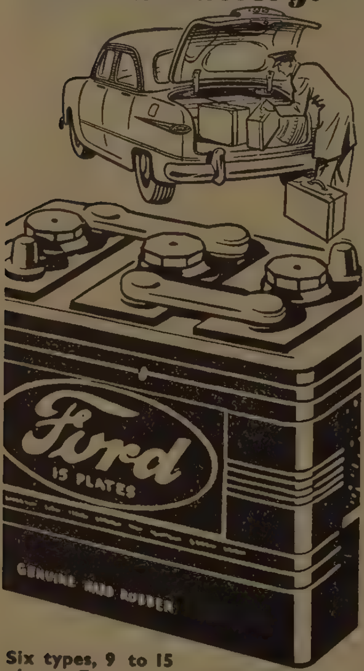

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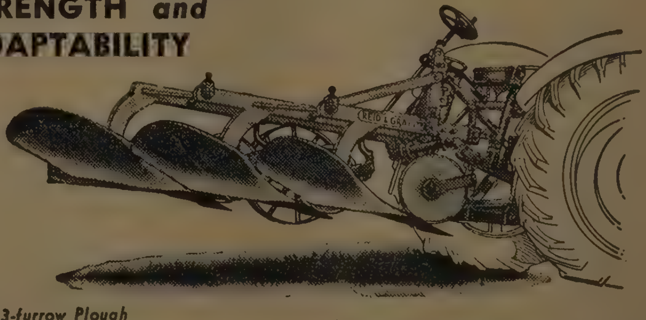

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the stocks used are unknown. Generally, as in other parts of the world, either Mazzard or Mahaleb seedlings have been used for propagation, Mazzard, the wild sweet cherry being the most common. Mahaleb is reputed to have a dwarfing tendency, though this has not always proved to be so, and though it is claimed to withstand drought conditions better than Mazzard, an incompatibility with a marked constriction at the union has been observed with some scion varieties.

Pollination

All varieties of cherries are self sterile; that is, they cannot produce fruit when fertilised with pollen from the same variety. There are also various groups the varieties in which will not set fruit when cross pollinated with each other. Therefore care is necessary in planning a cherry orchard to ensure that adequate pollinators are available and are properly placed to provide cross fertilisation.

Where varieties are of equal commercial value the best arrangement of pollinators is probably in alternate rows. If one variety is to be grown solely as a pollinator, it should be planted at least in every third space in every third row, giving a minimum of one pollinator to every 8 trees of the main variety. A mixture of varieties is not nearly as disadvantageous with cherries as it is with other kinds of fruit.

Suggested plans of planting with two methods of arranging pollinators are given here:—

PLAN No. 1

A	A	A	A	A	A
B	B	B	B	B	B
A	A	A	A	A	A
B	B	B	B	B	B
C	C	C	C	C	C
B	B	B	B	B	B

PLAN No. 2

A	A	A	A	A	A
A	P	A	A	P	A
A	A	A	A	A	A
A	A	A	A	A	A
A	P	A	A	P	A
A	A	A	A	A	A

Plan No. 1 has alternate rows where each variety is of equal commercial value and B is compatible with A and C.

Plan No. 2 has one commercial variety only (A) with one pollinator (P) to every eight trees.

Fortunately there are a number of varieties known as "universal donors" which are capable of cross fertilising any other variety which blooms at the same period. Two of these are Early Purple Guigne and Florence. These two varieties have been planted extensively, which may account for the few pollination problems in Central Otago cherry orchards. Information on the choice of varieties suitable for planting as pollinators may be obtained from the Horticultural Instructor at the nearest office of the Department of Agriculture.

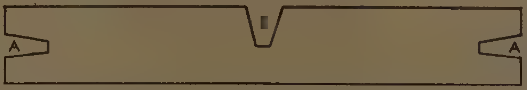
Planting

The soil should be in the best condition possible before the trees are planted. The land should be cleared of troublesome weeds such as couch grass and levelled for irrigation where this is necessary. During this operation care should be taken that when hollows are filled too much topsoil is not removed from the higher parts of the area.

Cherry trees in bloom. [*National Publicity*

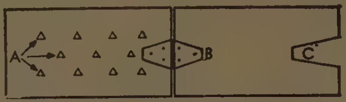
After thorough cultivation, and before the holes are dug, positions for trees should be marked with pegs. To ensure that trees are set in the correct position it is desirable to use a planting board.

This can be made from a length of 8in. x 1in. board 4ft. long, which will enable it to bridge any hole dug. At both ends and in one side deep notches are cut. The centre notch is placed against the peg marking the tree position and pegs are then driven securely in the notches at each end. The centre peg can then be moved and the hole dug, and on replacement of the board the tree may be planted in the exact position by placing the trunk as far in the centre notch as possible.



Planting board—A: Notches for pegs to hold board. B: Notch for tree, which when it is in the planting position must be in the centre of the board's width.

With this board all the tree holes can be dug before planting begins provided sufficient pegs are used. Care is necessary, however, to ensure that the pegs are not disturbed while the holes are being dug.



Planting board—A: Spikes for holding board in position. B: Hinge. C: Position of tree in centre of board's width.

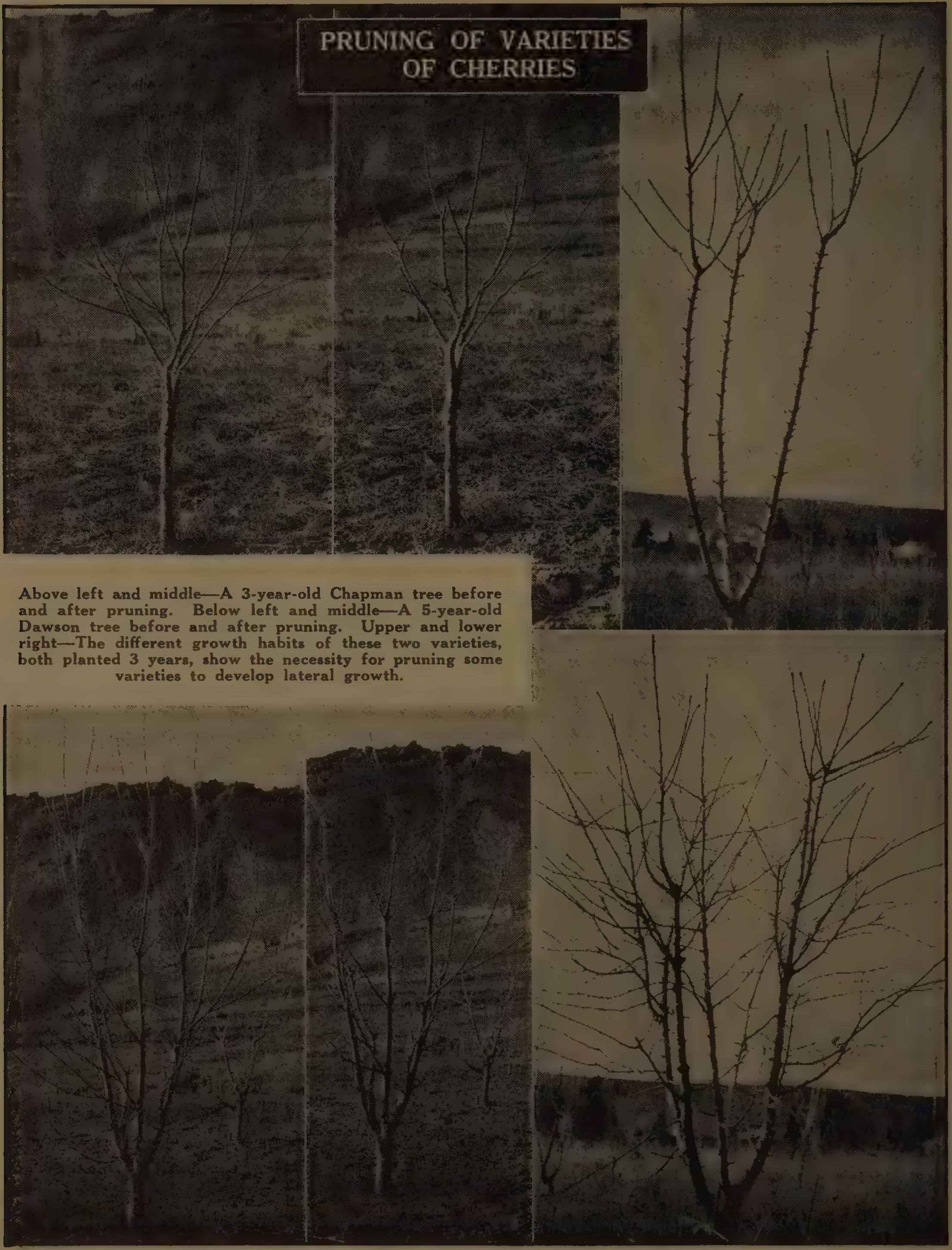
A type of board which does away with the necessity of using many pegs but requires each hole to be dug as the tree is planted consists of two pieces of 8in. x 1in. board each 1ft. long and joined together by a 6in. hinge. One board is notched to fit against the tree marking stake, and the other is held in place on the ground by several spikes which have been driven into it. The notched end is raised and thrown back while the hole is dug and can be swung forward to the original position to determine the exact placement of the tree.

Holes must be dug wide enough to allow for the spread of roots and deep enough for the tree to be planted at least as deep as it was in the nursery. The union between rootstock and scion must, however, be kept above ground level. Before the tree is planted broken roots should be cut off and the remainder trimmed. The top should not be pruned until after planting is completed. Good topsoil should be used for filling the holes. It should be worked well down among the roots and firmed, except for the top inch or two, which should be left loose and slightly higher than the surrounding area to allow for settling.

Generally, areas of cherries enclosed by wire netting are planted closer than un-netted areas, spacings of 12ft. and even 10ft. being not unusual. Where trees are un-netted the average planting space is 18ft. x 18ft., giving 134 trees per acre. Trees require adequate room to develop and this distance has been proved in many instances to be too close; a wider spacing of 20ft. to 25ft. each way would be preferable.

Close planting results in overcrowding and a restriction of the bearing surface of trees. Fruit is generally carried high up, making picking more difficult, and the more vigorous growing varieties tend to crowd out the less vigorous.

Thought given to factors such as selection of varieties, preparation of land, suitable siting, and distance apart



PRUNING OF VARIETIES OF CHERRIES

Above left and middle—A 3-year-old Chapman tree before and after pruning. Below left and middle—A 5-year-old Dawson tree before and after pruning. Upper and lower right—The different growth habits of these two varieties, both planted 3 years, show the necessity for pruning some varieties to develop lateral growth.

when a new planting is contemplated could save many disappointments later.

Pruning

The generally accepted idea that cherry trees require very little pruning compared with other tree fruits is based on sound principles, particularly in regard to bearing trees, but this does not mean that pruning is unnecessary. Light pruning will encourage earlier cropping and ultimately produce a larger tree than will heavy pruning, which tends to dwarf the tree and delay fruiting.

The young tree should be trained to an open centre or vase shape. Treatment for the first few years should be designed to build up a strong framework capable of carrying heavy crops without risk of branches breaking.

Trees received from a nursery have usually been headed back the previous summer and are well branched. At the first pruning up to three well-spaced growths are selected as future leaders, all other growth being removed entirely. These leaders are cut back to three or four buds, with the top bud pointing outward. At each annual pruning thereafter the number of leaders should be increased until the required number, usually six or seven, is obtained. This will be sufficient to form the desired, open-shaped tree. The leaders selected should be evenly spaced and not crowded, and will require heading back annually, about two-thirds of the previous season's growth being removed. If one leader tends to outstrip the others, cutting it back to below the level of the remainder will tend to even up the tree. Similarly, a weaker growing leader should be left uncut or pruned longer than the others.

Suitable lateral growth from the leaders is selected to be retained as future fruiting arms, all unwanted growth being removed.

An Early Lyons tree which has not been regularly pruned but which has a natural spreading growth habit and good lateral development.

As with other kinds of fruit trees, cherry trees have varietal differences in growth habits. Some varieties are vigorous and upright and others are more spreading. These varietal characteristics will influence pruning practice and allowance must be made for them.

Young, vigorous growth in cherry trees tends to branch only near the tip and must be cut back to induce branching at the desired point. Wood and blossom buds are rarely associated and care is necessary to ensure that growth is cut to a wood bud; otherwise it usually dies back. Some growers overcome this problem by pruning during the blossom period.

Straw mulch spread among cherry trees.

Once the framework has been formed pruning is usually restricted to removing broken limbs, dead or diseased wood, and eliminating crossed or overcrowded lateral growth. It is essential to maintain a balance between fruit production and growth by the removal of spent fruiting wood. Much of this pruning may be done just after harvesting, which is a good time to make any large cuts, as the risk of silver leaf infection at that period is considerably reduced.

The fruit is produced on spurs which usually remain vigorous longer than those of other kinds of fruit trees. There is therefore no need for such frequent renewal of fruiting wood. Pruned trees have several advantages over those not pruned. They carry heavier crops of larger fruits and are easier to spray and pick. It is wise, however, to avoid sudden, hard pruning of old trees which may have been neglected. Where treatment is warranted a gradual removal over a year or two of large unwanted limbs, carried out after each season's harvesting, does much to avoid the serious gumming which may otherwise occur.

Soil Management

Generally soil management is more important than pruning in the maintenance of vigorous, fruitful trees. The results obtained by growers whose practices are above the general level suggest that soil management in many orchards could be improved.

In some overseas countries the grassing down of cherry orchards is usual, but this is not so in Central Otago, where clean cultivation has been the normal procedure. In the past this has meant that weed growth was not allowed to any extent, but now the tendency is to reduce cultivation to a

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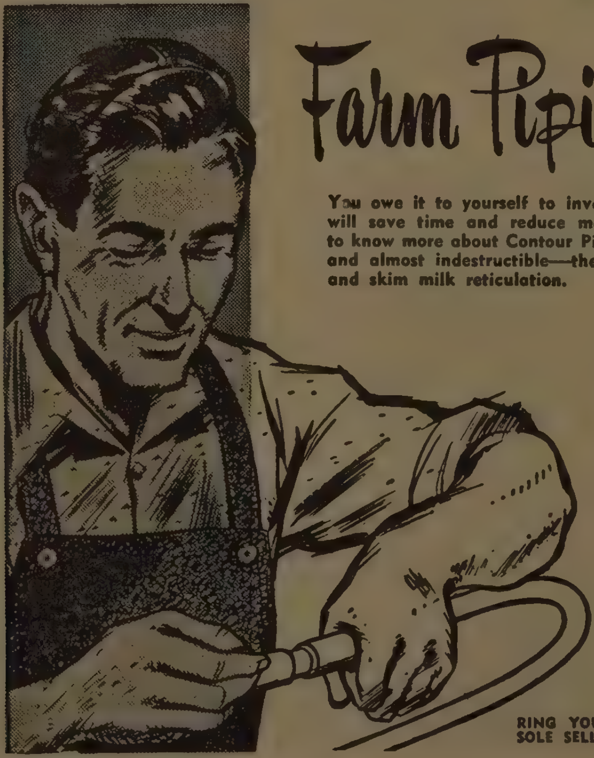

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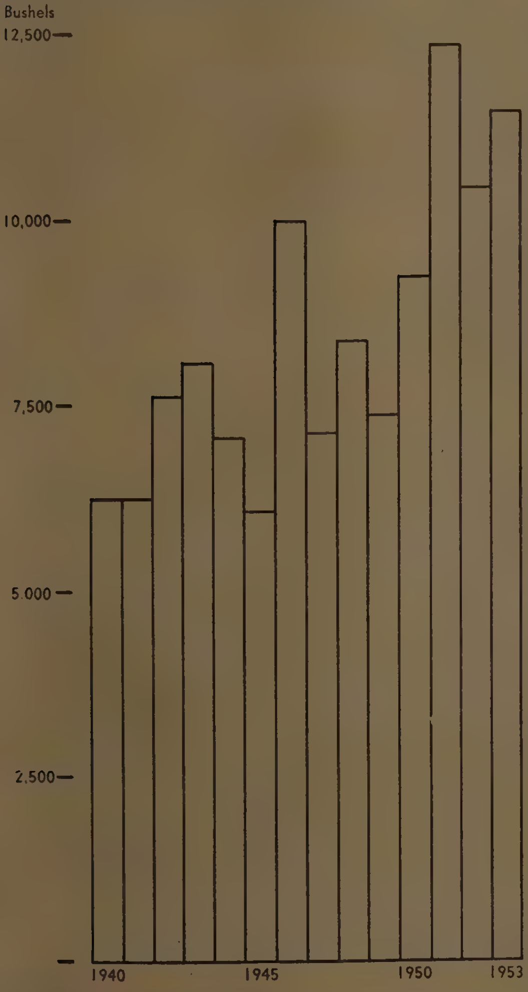
minimum and to allow weed growth during summer, especially where adequate water for irrigation is available. Many growers also mulch the trees with hay or straw in late autumn or winter to assist in building up the humus content of the soil, thereby increasing its fertility.

Clean cultivation temporarily promotes rapid, vigorous tree growth and is the better treatment for young orchards. Its main disadvantage with certain soils is the tendency to destroy organic matter. Any cultivation should be reasonably shallow to avoid damage to surface-feeding roots.

Cherries thrive best in soils high in nitrogen and containing large quantities of organic matter. Research work overseas has shown that the only visible response is to nitrogen and no doubt similar results would be obtained in New Zealand.

In their natural state the soils of Central Otago are noticeably lacking in humus and nitrogen and where the trees are closely planted the root-feeding areas of individual trees especially are very restricted.

Fire pots for frost control set out among cherry trees.



Estimated production of sweet cherries in Central Otago for 1940 to 1953.

There is no standard practice for fertiliser application. Blood and bone at a fairly low rate has probably been most commonly used; other organic and inorganic fertilisers have been used much less.

In addition to the sowing of annual crops or the use of straw or hay as mulch, a fertiliser mixture containing mainly nitrogen and applied at 7lb. to 8lb. per bearing tree is required annually.

With the alkaline soils of Central Otago it is probable that an inorganic form of nitrogen such as sulphate of ammonia would be preferable to blood and bone; this is particularly so where a quick-acting source of nitrogen is required; for example, to prevent depletion of soil nitrogen by bacteria when mulching material is decomposing.

Cherry trees are not considered to have a high lime requirement. Symptoms of trace element deficiencies are often found in fruit trees in Central Otago and the application of lime would almost certainly aggravate this position.

Frost Protection

Many orchards in Central Otago are subject to damage and loss of crops through frosts in late spring, and though efforts are made by growers to avoid selecting orchard sites in areas where frosts occur, available land in frost-free areas is scarce.

Cherries have a relatively late blossoming period, but the flower buds before opening are more prone to damage by frost than are those of other kinds of fruit. Because of this frost risk it is usual to install fire pots in cherry blocks where unseasonal spring frosts are likely.

The pots generally used are the "lard pail" type, which holds 10 pints of fuel oil and burns for approximately 3½ to 4 hours, unrestricted. Also used is a larger type of pot holding almost double the amount of oil and burning for about 7 hours. The pots are usually placed in the centre of each row and around the headlands, one pot per tree being provided, except in closely planted areas where fewer pots are required.

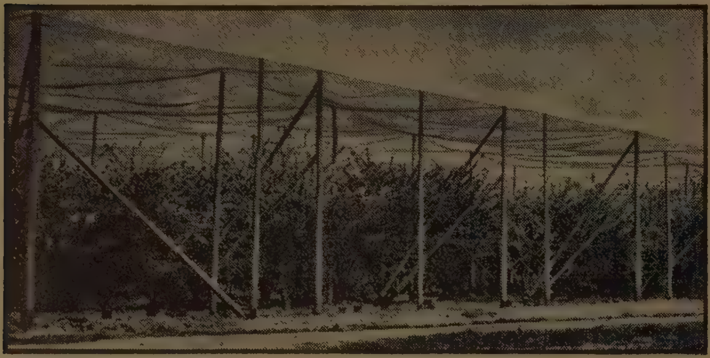
An alarm thermometer wired to ring in the grower's residence and set to a degree or two higher than the danger point is used to warn the grower of a dangerous drop in temperature. Other standard thermometers are set in various parts of the orchard and one is also placed outside the area of fruit trees to be protected. An overall picture can be obtained by the grower from reading these thermometers and a decision made on the number of pots to light or on a decrease or increase in the burning rate, depending on a rise or continued fall of temperature.

Bird Nuisance

Wherever cherries are grown birds are usually the worst menace. Enclosing the area of trees with bird netting constructed on a wooden or metal framework is the most effective method of protection (see Department of Agriculture Bulletin No. 273 for details of construction) and though the initial cost is high, the ultimate results of reduced loss through damaged fruit and saving of time and expense in protecting crops from birds by other methods repay the grower for the outlay.

Few areas have been netted in recent years owing to the difficulties of obtaining materials.

Above and below—Two views of a netted cherry enclosure covering 5 acres. The illustration below shows the method of internal bracing for the uprights.



SPRAY PROGRAMME FOR CHERRIES

Period of application	Commercial orchard Application recommended	Home orchard To make 4 gallons of mixture	For control of
Dormant	Winter oil 1 : 20 or Lime sulphur 1 : 10	1 pint 12 fl. oz. 3 pints 4 fl. oz.	Scales, mites, aphides
Bud movement	Bordeaux 10 : 8 : 100 Lime sulphur 1 : 30	6⅓oz. of bluestone and 5¼oz. of hydrated lime 1 pint 1⅓ fl. oz.	Fungous diseases
Late pink	*Lime sulphur 1 : 100	6½ fl. oz.	Brown rot
Petal fall	Lime sulphur 1 : 150 plus colloidal sulphur 2lb. : 100 gallons	4¼ fl. oz. 1¼oz.	Brown rot
14 days before harvest	Lime sulphur 1 : 150 plus colloidal sulphur 2lb. : 100 gallons	4¼ fl. oz. 1¼oz.	Brown rot
Leaf fall	Bordeaux 10 : 8 : 100	6⅓oz. of bluestone and 5¼oz. of hydrated lime	Fungous diseases

* Sulphur sprays are required only where brown rot is prevalent.

For control of cherry slug or leaf-roller caterpillar use 2lb. of basic lead arsenate plus 3lb. of hydrated lime to 100 gallons of water, or 1lb. of D.D.D. 25 in 100 gallons of water.

If green or black aphides are observed during summer, apply:—

Nicotine sulphate, 1 pint to 100 gallons of water, plus 3lb. of soft soap, or

H.E.T.P., 1 pint to 250 gallons of water.

H.E.T.P. is highly poisonous and every care should be taken in its use. Makers' recommendations should be closely followed.

To lessen cracking in cherries during showery weather use summer oil 1 : 100.

Certified copper compounds may be used in place of Bordeaux mixture at strengths recommended by manufacturers.

For further information consult the district Horticultural Instructor.

Some areas are too extensive to net and other methods of scaring the birds have to be adopted. Efforts are made to reduce the bird population by laying poison grain during late winter, when feed is scarce, and by paying a bounty on birds' eggs. Carbide guns, travelling scarecrows, and various types of hand- or motor-operated rattlers are all fairly effective, and though none of the mechanical scarers in use entirely eliminates the use of a shotgun, they do reduce time and labour spent in patrolling the orchard from daylight to dark as well as the number of cartridges used in a season. Some birds are more troublesome than others; starlings in particular invade the orchards and attack the fruit without any apparent fear of shotguns or scarers.

Pest and Disease Control

Pests

Compared with other deciduous fruit trees cherry trees are subject to few pests and diseases and these are much less serious in the dry climate of Central Otago than in other parts of New Zealand.

The two major insect pests of cherries are black cherry aphis and cherry slug.

Black cherry aphis (*Myzus cerasi* F.) is a large, metallic black aphis which exudes copious honey dew on which sooty mould develops, spoiling any fruit with which it comes in contact. The shiny black eggs are laid on buds and bark of cherry trees, where they overwinter, hatching in spring, when the young aphides attack young shoots and leaves, frequently causing them to curl.

This pest can be controlled by the application of winter oil during the dormant season or with nicotine sulphate or organic phosphate sprays during early spring.

Cherry slug (or leech) (*Caliroa limacina* Retz.), the adult of which is a saw fly, is a tadpole-like creature about ½in. long, slimy, dark green or brown, and which feeds almost entirely on the upper surfaces of the leaves. The slugs complete their growth in from 3 to 4 weeks and then fall to the ground and form a small cocoon. This stage lasts about 2 weeks, after which the adult fly emerges.

The growth of the tree and the following season's crop may both be seriously reduced following the destruction of leaf tissue, and this, if unchecked, over a period of years may eventually kill the tree.

Other aphides and scale insects, though prevalent at times, are not serious pests in Central Otago.

Diseases

The main bacterial and fungous diseases to contend with in Central Otago are stone fruit blast, brown rot, silver leaf, and shot hole.

Stone fruit blast is a recently diagnosed bacterial disease which causes serious gumming and die back of laterals and leaders and even death of the tree. No control measures are known, but recent laboratory tests indicate that sprays containing streptomycin will give protection against this disease.

Brown rot (*Sclerotinia fructicola* (Wint.) Rehm.): Though not as common as in other districts, this well-known disease can be the cause of serious fruit loss in some seasons. Strict orchard hygiene and the use of Bordeaux or lime sulphur sprays at leaf fall and bud movement will do much to reduce its incidence, and some of the newer fungicides such as captan, thiram, and phygon show promise.

Silver leaf (*Stereum purpureum* Pers.) is not as prevalent as in other parts of New Zealand, but frequently attacks cherries. The first indication of its presence is the silvering of the foliage, followed by decline in vigour. Affected branches or whole trees may die from severe infections. Control measures consist of cleaning up all likely sources of infection such as willow and poplar trees, which are among the many hosts, removing and burning infected branches and trees in summer, and covering all large saw cuts with a good wound-sealing compound as soon as possible after they are made.

Shot hole (*Phyllosticta prunicola* Sacc.) attacks the leaves of the cherry, causing small circular brown spots which soon become brittle and fall away, giving the foliage the appearance of being covered with shot holes. Similar symptoms are also caused by stone fruit blast and a suspected virus. Control of shot hole is by application of Bordeaux sprays.

Other minor diseases include cherry leaf curl, fortunately rare, which cannot be controlled by spraying, as the mycelium overwinters in the shoots. When infection occurs it is necessary to remove and burn the infected portion. Coral spot, leaf rust, and valsa also occur, but are not usually important.

Fruit cracking owing to rain before or during harvesting is often the cause of considerable losses, not only because of the cracking, but also through the entry of fungous spores which cause the fruit to rot.

Most of these troubles may be controlled by thorough spraying. A recommended programme is as follows: While trees are still dormant either winter oil or a strong lime sulphur should be applied to kill aphis eggs and scales. At bud movement in spring and again at leaf fall in autumn Bordeaux mixture or lime sulphur sprays should be used for control of fungous and bacterial troubles. Cherry slug can be controlled with lead arsenate or D.D.D. sprays well before harvest and after its completion. If black cherry aphis begins to build up in spring, either organic phosphate or nicotine sulphate sprays should be applied, and if rain is likely at harvest, summer oil should be used to reduce the incidence of cracking

[*J. F. Shepherd*

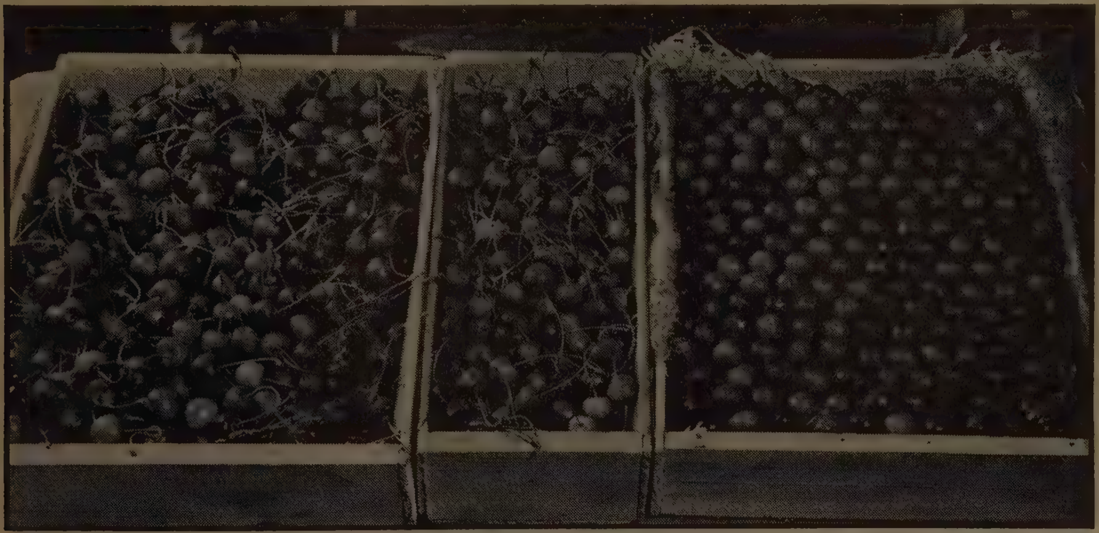
Arrangement of first layer of fruit when a box is "faced".

No real means of control is known for certain physiological disorders in trees such as gumming and forms of die back, which at times are prevalent Some varieties of cherries are more prone to these than others and this has been a contributing factor to their omission from more recently planted areas.

Some conditions which are almost certainly due to viruses occur in Central Otago orchards, symptoms being very similar to those described in America. A complete investigation has not yet been made, but so far none of the more serious diseases recorded overseas has been observed.

Research into these problems is being continued.

A chlorotic condition observed on foliage of cherry trees indicates possible trace element deficiency. Experience with a similar condition in other fruit trees suggests that the application of certain elements, particularly zinc, would produce responses on trees in certain areas. Boron is the only trace element proved to be lacking,



[*J. F. Shepherd*

The cases at left and centre have the fruit packed in the normal way, and that at right has been "faced". The two sizes of cases shown are those in general use, the large ones holding 10lb. of fruit and the small one 5lb.

[*J. F. Shepherd*

A crate of cherries ready for dispatch, showing the method of wiring three boxes together.

and deficiency is indicated on the fruit by a depressed area surrounded by hard brown flesh, usually at the apex of the fruit. This deficiency can be remedied by applying borax either as a soil dressing at ½lb. per tree or by a foliage spray containing borax and hydrated lime in equal quantities applied at a strength of up to 6lb. to 100 gallons of water. The latter method is the more common in cherry orchards where boron deficiency is known, the application often being made with the first spray to control cherry slug.

Harvesting and Packing

Cherries are the first tree fruit to ripen and are harvested from about mid-November until the end of December or early January, according to variety, season, and locality. The correct stage of maturity at which to pick each variety depends on the distance the fruit has to travel. Early varieties are often harvested slightly immature to take advantage of the high prices paid for new season's fruit. This is a bad practice, as the consumer receives a poor product, which tends to discourage further buying. In addition the grower, though probably obtaining a high price per pound of fruit, loses an appreciable weight of fruit, as this increases rapidly during the latter stages of maturing.

Cherry fruits do not seem to improve in flavour and colour after harvesting and if picked fully mature, remain firm in texture longer and are subject to less shrinkage than those picked in an immature condition.

Cherries should always be picked with the stalks attached, as their removal ruptures the skins, allowing juice to exude, which results in the fruit becoming sticky and unattractive as well as creating easy entry for fungous diseases which cause the fruit to rot.

Rough methods during picking are liable to remove spurs from the tree which may puncture the fruit when it is placed in the picking container, in addition to reducing the potential crop for the following season.

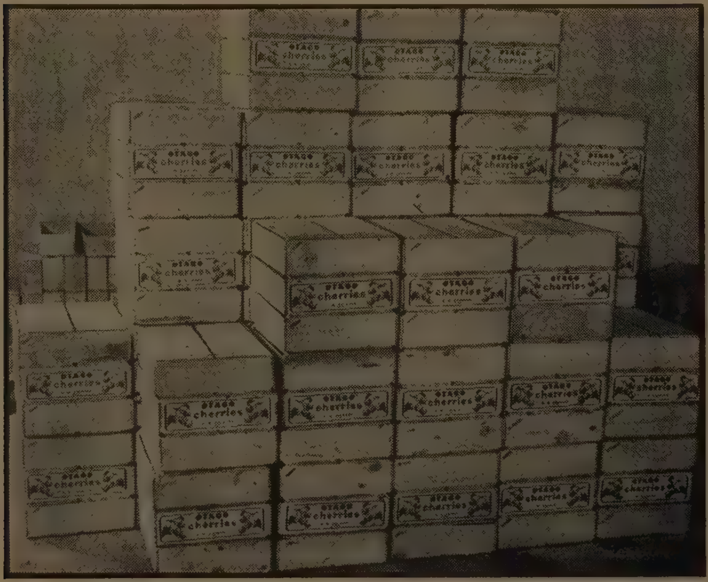
Usually more labour is required during cherry harvesting than with any other kind of fruit. Careful instruction to new employees in the handling of ladders among trees and in the careful handling of the fruit when it is picked is essential if losses are to be avoided.

Containers for use during picking vary, according to the individual ideas of the growers, from small metal buckets (usually with a hook attached to the handle so that the bucket can be hung on a branch) to wooden boxes (suspended by means of a broad strap from the picker's shoulders). When picked the fruit is taken to the packing shed, where it is hand sorted and culls are removed. It is then placed in paper-lined cases usually measuring 3½in. deep, 11½in. wide, and 14in. long and holding approximately 10lb. of fruit. Very few, if any, cherries are processed, most being sold as fresh fruit.

The relatively small variation in size of cherries as compared with other fruits makes sizing unnecessary, and colour grading is not done. The usual method of packing is a jumble pack with no placement of individual fruits in the boxes, though care is taken to ensure that the container is compactly full.

An exceptionally good variety or line of fruit may occasionally be "faced", a method which entails the placing of individual fruits in rows in the first layer in the box, the remainder being jumble packed. After the lid is put on, the box is reversed for branding or labelling. The bottom then becomes the top and when the box is opened for sale a neat "faced" surface of cherries is seen by the buyer. There is a limited demand for this type of pack for window dressing, and the higher price paid may compensate the grower for any extra time involved.

The packed boxes, being small and light, are usually wired together in bundles of three to facilitate handling in transit.



A line of fruit ready for dispatch to market. [*J. F. Shepherd*

Transport and Distribution

Efficient freight services and quick distribution are essential to enable cherry growers to get their product to the public in first-class condition. Central Otago is handicapped through its long distance from the main centres of population. This has been a limiting factor in the expansion of cherry growing in the area, despite its suitability for producing high-quality fruit.

A sign of the times is the use of aircraft to transport fruit from production centres in Otago to markets in the North Island. High cost of freight by air considerably restricts the use of this method, and rail and road services are fully used in an endeavour to spread distribution as much as possible.

Cool Storage

Cherries do not keep well in cold storage for long, the limit being for a few days at a relatively low temperature of from 32 to 40 degrees F.

Pre-cooling of fruit destined for long distance travel is sometimes done with good results, but all fruit should be packed before being placed in cool store, as it seldom stands up well to handling on removal.

When removed from cool storage the cherries will be colder than the air and atmospheric moisture will condense on them and make them damp and of dull appearance. Brown rot spores are likely to develop on the fruit under these conditions.

HEADING PHOTOGRAPH: Ewes and lambs on the farm carrying 8 ewes per acre.

Increasing Meat Production per Acre

"JUST as a target of 250lb. of butterfat per acre should be attainable by every dairy farmer, so should a target of 250lb. of meat per acre be the objective of every fat lamb farmer" is the conclusion drawn by D. E. K. Walker, Research Officer, Department of Agriculture Animal Research Station, Ruakura, from results of trials begun at Ruakura 5 years ago to compare meat production under different systems of stocking. The outcome of inquiries into which system of farming produces the most meat per acre was given by Miss Walker in a paper at this year's Ruakura Farmers' Conference, an adaptation of which follows.

THE drive for increased meat production during the war and post-war years brought to light many gaps in existing knowledge. At Ruakura an attempt has been made to fill some of these gaps and generally map factors affecting meat production.

On fully developed farm land two main factors influence production—production **per animal** and production **per unit area**. Production per animal is influenced by many genetic, nutritional, and managemental factors, many of which have been studied at Ruakura. Some of these, including the basic factor of genetic merit, are largely beyond the control of the fat lamb farmer who does not breed but buys ewes and cattle.

Production per unit area, or per acre, depends primarily on the number of stock carried on that area. This is a matter completely within the control of the farmer and is therefore capable of modification in any desired direction. Little work has been done on this aspect, particularly in regard to sheep and beef cattle. The largest and most keenly sought part of New Zealand's meat exports is lamb and beef. Under this country's farming system these two types of meat are produced on the same farm. There are comparatively few straight-out beef fattening farms. By far the greatest proportion of the fat cattle marketed comes from fat lamb farms where they have been run primarily to control pasture growth. Production per acre may, therefore, be affected not only by the number of stock carried, but also by the proportion of cattle to sheep.

Complicating Variations in Practice

Policy as regards cattle varies, particularly with regard to time of purchase and age of stock bought. Some farmers are prepared to cut hay to winter cattle, but others prefer to buy in store cattle in spring. Again, some farmers consistently buy in young stock "to grow into profit", but others prefer to purchase mature cattle to fatten off as quickly as possible. If cattle are not wintered, more ewes can be carried, so cattle policy also affects ewe stocking rates. This lack of uniformity in farming practice complicates any attempt to investigate factors affecting lamb and beef production per acre, but at the same time it offers scope for an investigation into the efficiency of the various stocking policies; that is, which system of farming produces the most meat per acre.

Five years ago a trial was begun at Ruakura to compare meat production under different systems of stocking. An area of approximately 150 acres was available and this was divided into three farms as equitably as possible. For a start three basic systems practised by fat lamb farmers were compared and these may be defined by the attitude to cattle as follows:—

1. Growing cattle wintered and eventually fattened.
2. Cattle bought in in spring and fattened in the current season.
3. No cattle.

The average efficient farmer in the Waikato carries 4 ewes per acre and winters approximately ⅓ cattle beast per acre. This stocking was therefore adopted on the first farm as the standard for comparison. For the second farm (no cattle wintered) 6 ewes per acre was considered feasible, with forward store cattle to be bought in in spring as required and fattened off by the following autumn. On the third farm (no cattle run) 8 ewes per acre seemed a reasonable target.

The stocking rates and ratios of the three farms were thus:—

1. 4 ewes per acre plus ⅓ cattle beast per acre wintered.
2. 6 ewes per acre plus spring cattle.
3. 8 ewes per acre plus no cattle.

As the whole area had previously been carrying 5 ewes per acre, a trial year was run first to condition the pastures to the intended levels of stocking. Three experimental years followed, the details of which are presented.

Procedure

A straight line of 900 5-year-old ewes was bought in each year and divided among the three farms. All the rams used were Southdowns and were purchased from the same breeder throughout the 3 years.

On the farm carrying 4 ewes per acre 12 weaner steers were bought in each autumn and fattened off at 2 to 2½ years old. Two age groups were thus always on hand. Purchase of young cattle involves a lower capital outlay, and though the turnover is slower, handling of a mixture of age groups has certain advantages. Weaners must be done well during

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their first winter, but older cattle can be wintered harder. After the winter young cattle can take second place while preference is given to the older stock intended for fattening in the current season. The farmer who buys older cattle works along similar lines by drafting out his more forward animals and giving them preference.

Additional cattle were bought in spring for this area when required. This was warranted in each of the three seasons. Competition for cattle, particularly forward stores, is naturally always strongest in spring. Prices are relatively high and the margin for profit is reduced. Cattle may actually be run at a financial loss if they are bought at peak prices in spring and sold when the fat cattle market is most heavily supplied in autumn. This situation has to be faced annually when the regular policy is to buy in forward stores in spring. On the farm carrying 6 ewes per acre, where this system was followed, 15 forward stores were bought in each spring. They were sold on the hooks at schedule rates in autumn, usually at a financial loss. The fact that so many farmers follow a similar policy is evidence of the importance attached to the necessity for controlling sheep pastures with cattle. On the farm carrying 8 ewes per acre no cattle were run and the ewes managed to deal quite competently with all the feed available.

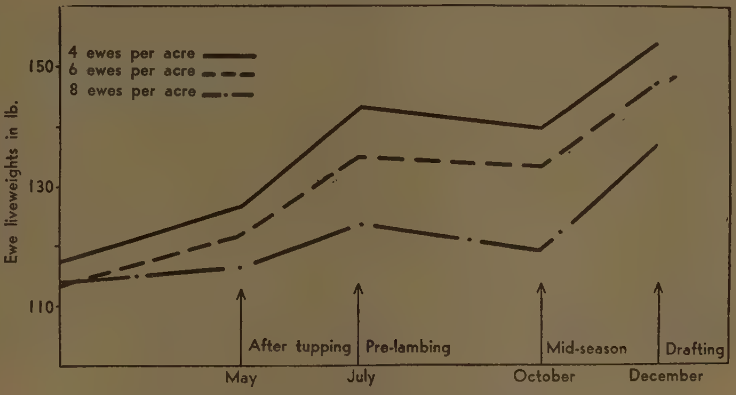
For this article the results of all three seasons have been averaged. Some of the vital statistics are shown in Table 1.

TABLE 1—VITAL STATISTICS

	Ewes per acre 4	6	8
Number of ewes mated	570	882	1,212
Per cent. ewes died ..	6	5	4
Per cent. ewes dry ..	12	9	8
Lambing percentage ..	108	112	107
Per cent. lambs died ..	15	12	15

There was little difference between the three groups. Ewe mortality was similar on each farm. An attempt was made to establish the cause of all deaths to see whether the different nutritional levels had any differential effect on health. The numbers concerned were too small for any conclusion to be formed. It was expected that on the farm with 8 ewes per acre some trouble might be experienced from pregnancy toxaemia, but no cases occurred. This was probably due to the fact that this group was on a **continuous** low plane of nutrition from the end of tupping until after lambing.

The percentage of dry ewes was slightly higher on the farm with 4 ewes per acre. Lambing percentages were low in the first year, when a poor line of ewes was farmed, but in the second and third years, with good ewes, percentages were quite high. The farm with 6 ewes per acre showed a slightly higher average over the 3 years. On the farm with 4 ewes per acre the ewes tended to be too fat and lazy to exert themselves either during parturition or in attending to their lambs after birth. At the other extreme the ewes on the farm with 8 ewes per acre were sometimes too hungry to let the exigencies of birth delay their hunt for food for longer than was absolutely necessary and wandered away from their lambs. Losses also occurred in this group through mismothering owing to the greater number of ewes in the paddock.



Growth curves of ewes on the three farms.

The liveweight changes of the ewes are shown in the graph above. Weights were recorded at six critical points during the year—on arrival, after tupping, just before the beginning of lambing, in mid-season (that is, approximately half-way between lambing and drafting), and when the first draft of lambs was taken in mid-December. It has been normal practice to wean at this stage unless pasture growth is abnormally good. For production records ewes were finally weighed just before they left the property, but these weights have not been shown, as they were influenced by factors such as availability of feed and more particularly the destiny of the ewes; that is, whether they were to be sold as fats, as stores, or as 6-year breeding ewes.

During winter (May to July) the 8-per-acre showed only a slight increase in body-weight. In fact, if allowance is made for wool growth and foetal development, there was a loss in body-weight between the end of tupping and the beginning of lambing. In spite of this the ewes were fit and active, though hungry. By weaning time in mid-December most of the 4-per-acre and 6-per-acre ewes were over-fat for retaining for breeding or for killing. Remedial measures were taken during January. The 8-per-acre ewes still tended to be too thin to kill, though they were in good condition for breeding when the lambs were drafted.

Lambs were drafted by a commercial picker in the normal way. Table 2 shows the carcass weights and grades for all lambs drafted.

TABLE 2—LAMB KILLING DATA

	Ewes per acre 4	6	8
Number of lambs fattened	589	939	1,172
Carcass weight ..	34.5	33.3	31.6
Grading per cent:—			
Down	68	63	44
Prime	28	32	43
Second	4	4.5	13
Reject	—	0.5	1
Number of store lambs	—	13	53

The 4-per-acre lambs were about the average weight for the district. They were just over 1lb. heavier than the 6-per-acre lambs and nearly 3lb. heavier than the 8-per-acre lambs.

There was little to choose between the grading of the 4-per-acre and 6-per-acre lambs. The lambs off the farm with 8 ewes per acre were undoubtedly leaner and did not grade as well. All the 4-per-acre lambs were fattened, but approximately 1 per cent. of the 6-per-acre lambs and 6 per cent. of the 8-per-acre lambs were sold as stores. If a really dry season had occurred during the 3 years of this experiment, these figures would most certainly have been higher. The percentages of lambs sent away in the first draft in December were as follows: Farm with 4 ewes per acre, 54 per cent; farm with 6 ewes per acre, 44 per cent; and farm with 8 ewes per acre, 34 per cent. The picker was instructed to take all lambs that would grade but no seconds in the first draft.

The average weight of meat per acre produced annually on each of the three farms is shown in Table 3.

TABLE 3—MEAN MEAT PRODUCTION
(lb. per acre per year)

	Ewes per acre 4	6	8
Lamb	142	215	254
Beef	117	44	—
Total	259	259	254

When the amount of beef carcass weight is added to the outputs of the farms carrying 4 and 6 ewes per acre it will be seen that there is a marked similarity in the production of quality meat from the three farms. This indicates how the fat lamb farmer can adjust his plans according to market demands and prices without any loss of production. When lamb prices are high relative to the price of beef he can achieve the same meat production per acre by stocking more heavily with sheep, and if lamb prices fall, he can increase beef production.

The price of meat is not the only factor to be considered, however. Wool production is an important sideline on the fat lamb farm. It is conceivable that even if lamb prices were to drop considerably, it might pay to farm sheep rather than cattle if wool prices remained high. At the moment, with the outlook for food production brighter than that for production of natural textile fibres, this situation does not seem likely to occur. Nevertheless, whatever happens to world markets, the fat lamb farmer will always have wool to dispose of. Wool production figures for the three farms are shown in Table 4.

TABLE 4—WOOL PRODUCTION PER YEAR

	Ewes per acre		
	4	6	8
	lb.	lb.	lb.
Ewe fleece weight ..	9.6	9.2	8.4
Ewe wool per acre ..	42	58	72
Lamb wool per acre ..	1	3	8
Total wool per acre	43	61	80

The 4-per-acre ewes produced nearly ½lb. of wool more than the 6-per-acre ewes and just over 1lb. more than the 8-per-acre ewes. After the second draft of lambs were slaughtered the remaining lambs were shorn and the lambs' wool brought the total wool production up to 43lb., 61lb., and 80lb. respectively, which is roughly in the same ratio as the stocking rates.

The effect on wool quality of any check to a sheep is well known. Breaks and cotts and other wool faults occur when an animal is subjected to an uneven plane of nutrition or is in ill health.

From the growth curves shown in the graph it was obvious that marked nutritional differences existed between the groups. It could be expected that the quality as well as the quantity of wool would be affected. Each fleece was graded for faults as it was shorn. Table 5 shows the percentage of fleeces in each group showing breaks and cotts, and the mean price per pound obtained in each group.

TABLE 5—WOOL QUALITY AND PRICES

	Ewes per acre		
	4	6	8
Per cent. fleeces showing:—			
Breaks	19	26	27
Cotts	9	11	16
Mean price per pound	36.7d.	37.5d.	38.1d.

The percentages showing breaks were quite high in every group. As might be expected wool off the 4-per-acre ewes showed the fewest breaks, but the 6-per-acre ewes were surprisingly close to the 8-per-acre ewes in this respect. The percentage of cotted fleeces increased more proportionally with the rate of stocking. Generally the 8-per-acre ewes' wool was inferior on both scores. Quality has been defined as "what the consumer demands". What the consumer demands he pays for, so maybe the conception of "quality" in wool will have to be expanded to embrace a certain percentage of cotts and breaks.

Though the main interest in this experiment was the production factor, records have been kept of financial transactions pertaining to stock and are shown in a very summarised form in Table 6.

TABLE 6—ANNUAL FINANCIAL ASPECTS FOR STOCK

	Ewes per acre		
	4	6	8
	£	£	£
Outlay	1,091	1,346	1,320
Returns	1,856	2,237	2,332
Profit (total) ..	765	891	1,012
Profit (per acre)	16	18	20

The outlay, returns, and profit relate to each 50-acre farm. The low level of sheep stocking and the purchase of young growing cattle in autumn involved the lowest capital outlay. The outlay was greatest on the farm which carried 6 ewes per acre, involving the purchase of cattle at high prices in spring. Returns were highest from the farm carrying 8 ewes per acre. The profit per acre increased as the ewe stocking rate increased. The peak wool prices of 1951 are not involved, so the returns from the farms stocked with the greatest number of sheep have not been unduly favoured. All these figures can be greatly altered by price changes, particularly in respect to wool. Over the 3 years the average opening price for lamb was 18½d. per pound. The price for beef in February-March was 11d. per pound, and the price of wool approximately 37d. per pound.

Though there is a margin of stock profit shown in favour of the farms with the greater number of ewes, net returns might not be so encouraging. No attempt has been made to assess labour and working charges. On a commercial scale the doubling of ewe numbers would probably necessitate the employment of extra labour. Another factor in the heavy stocking is the effect on pastures.

Pastures

Obviously the effects of three different levels of stocking on the pastures concerned are going to influence long-term production. Officers of the Grasslands Division of the Department of Scientific and Industrial Research conducted a pasture analysis over the three farms toward the end of the trial. The following is their summary of the situation:—

> In general, 8-ewe paddock swards contained more species than either of the other two treatments. They are characterised by an appreciable invasion of goosegrass, traces of several other grasses, and some weeds. Ryegrass is relatively prominent, whereas fog is relatively not prominent. There is less cocksfoot than in the 4-ewe treatment. All herbage appears to be utilised, as is indicated by the lower percentage of fog. As a consequence the more palatable species are periodically very severely grazed, permitting invasion by poorer grasses and weeds. The decrease of fog seems to indicate adequate seasonal management, but unavoidable droughts have rendered invasion possible.
>
> On the 6-ewe treatment it does not appear that full utilisation has been achieved. Selective grazing and seasonal influences have led to decreased cocksfoot and clovers and to increased fog, browntop, and poa.
>
> With full utilisation the 4-ewe swards are comparable with the 8-ewe swards; somewhat less ryegrass is present and more fog. Fewer weeds are present. Desirable sward elements (ryegrass, cocksfoot, and clovers) contribute 57 per cent. to the production of the 8-ewe swards, 38 per cent. to the 6-ewe swards, and 56 per cent. to the 4-ewe swards. In the 8-ewe swards 16 to 17 per cent. of the less desirable grass growth is seasonal and does not contribute much to annual production. The less desirable grass growth of the 4-ewe swards is relatively constant, and so acceptable fodder is always accompanied by an appreciable quantity of less palatable, poor grass. The 6-ewe swards are the worst.

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This was the picture after 4 years' stocking at the given rates. If the experiment had continued for a further period, it does not seem unreasonable to predict that the weed situation on the farm carrying 8 ewes per acre would have become progressively worse, particularly after a drought season such as was recently experienced.

Summary of Production

The mean production records for the 3 years on the three farms can be summarised as follows:—

1. Lamb production per acre increased with increasing ewe stocking rates. Thus, relative to the standard 4 ewes per acre level, 6 ewes per acre gave a 52 per cent. increase and 8 ewes per acre a 79 per cent. increase in lamb meat per acre.
2. Total meat production per acre was virtually identical for the three farms. The added beef per acre from the cattle run on the farms with 4 ewes and 6 ewes per acre made the total meat outputs almost equal.
3. The performance of the three farms for the 3 years has shown that a target of 250lb. of meat per acre is a reasonable objective on country typical of that used for fat lamb production in the Auckland Province.
4. Wool production per acre increased with increasing ewe stocking rates. Thus, relative to the standard 4 ewes per acre level, 6 ewes per acre gave 42 per cent. increase and 8 ewes per acre 86 per cent. increase in weight of wool per acre.
5. Vital statistics of the three flocks on the three farms showed only small differences over the total period. Effective lambing percentages, lamb mortality, percentage of dry ewes, and ewe deaths tended to be in favour of the farm carrying 6 ewes per acre.
6. Pasture quality deteriorated to some extent under the highest ewe stocking rates.
7. Despite the same total meat outputs, returns from stock transactions increased with increasing ewe stocking rates. Relative to the standard 4 ewes per acre level 6 ewes per acre showed an increased cash return of 12½ per cent. and 8 ewes per acre of 25 per cent. per acre. This situation resulted from the higher value per pound of lamb relative to beef, and also from the comparatively high wool prices.

Two major points emerge from this study. First is the scope the fat lamb farmer has to adjust the ratio of sheep to cattle to meet market demands, changes in price levels, or personal preferences without affecting his per acre production of quality meat. Second, just as a target of 250lb. of butterfat per acre should be attainable by every dairy farmer, so should a target of 250lb. of meat per acre be the objective of every fat lamb farmer.

Problem Soils and their Treatment in Home Gardens

PROBLEM soils and their treatment in home gardens and work in the vegetable garden in February are discussed in this article by A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin. February is usually one of the most rewarding months in the home garden. Few gardens lack vegetables then, but if the growth of vegetables is good, so too is weed growth. Apart from making sowings and plantings which will develop during favourable autumn weather, the most important job in most gardens is to destroy weeds that, if left, will suppress any but the most vigorous or mature crop plants. As many weeds produce seed in February, they are likely to re-infest the ground with seed, which may be a source of trouble throughout the year. Many weeds are alternate hosts for pests and diseases and help to carry them over from one season to the next.

SOIL must be in good condition for the satisfactory growth of most vegetable crops, but the soils in many of the older home gardens and also in many of the newer housing areas are very poor.

The soils in the newer areas usually contain fewer plant diseases, but in many instances they are not primarily horticultural soils; that is, before subdivision they were unsuited to the commercial production of vegetable crops and such crops can be grown on them satisfactorily only if they are improved by such factors as water, shelter, drainage, fertilisers, and organic matter.

Organic matter, which is usually the most important factor, is the decayed animal and vegetable matter which gives soils their dark colour and it is the key to the fertility of garden soils. It is being lost continuously in most home gardens owing to various breaking down agencies, fermentations due to fungi and bacteria working in linked progressions, oxidation due to exposure of the soil particles to the sun and air in repeated cultivations, and to the leaching of rain and wind.

Many of the older home garden soils that have been cropped for perhaps 15 to 20 years or more are in poor condition for growing vegetable crops, mainly because of lack of organic matter, as relatively little has been done to maintain or increase the amount in them.

Too often the sole improvement measures have been the addition of mineral fertilisers such as sulphate of ammonia or relatively light applications of organic manures such as blood and bone. Green manure crops would do much toward building up the organic content of these soils.

Soil Improvement

The solution to the problem of improving the more intractable clay soils or excessively light soils and the older worked-out soils is the addition of organic matter such as farmyard manure, straw, compost, rotted sawdust, leafmould, seaweed, and rotted stack bottom, and the digging in of mature green crops.

The mechanical condition of sticky clays can in addition usually be improved to some extent by adding gritty material such as sand, which tends to improve drainage and aeration and make soils more open and amenable to cultivation, but a large amount is needed to alter the texture of the soil of even a moderate sized garden.

In most districts sawdust is the cheapest and most readily available source of organic matter, but if it is to be used in quantity it should be rotted before it is applied to the land. On areas that are not too exposed sawdust can be used as a mulch up to about 3in. thick, depending on whether there are plants in the area and their size. If too much unrotted sawdust is dug into ground that is to be cropped immediately, plants may suffer from nitrogen starvation and become pale and weak. Such plants usually recover if kept well watered and fed at weekly intervals with sulphate of ammonia at about 1oz. to 2 gallons of water.

For best results in adding organic matter containing much fibre to the soil it is advisable to apply additional nitrogen in the form of sulphate of ammonia, as the carbon to nitrogen ratio of such fibrous material is usually too high for its most efficient utilisation.

Soils can also be improved if green or cover crops are dug in regularly, but such crops should be bulky. In heavy soils particularly, they should be grown until they contain a great deal of fibrous matter which when dug into the soil will not readily be dissipated but will combine gradually over a period with the gritty and

---

HEADING PHOTOGRAPH: Few gardens lack vegetables in February and one of the most important garden jobs is to keep the crops free from weeds by hoeing regularly. Green and Hahn photo.

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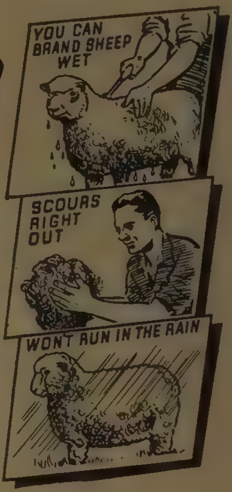
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Barley is a useful soil-improving crop that will usually succeed at lower temperatures than will lupins, but to improve the soil barley must be well grown, tall, and heavy when dug in.

colloidal matter in the soil and form soil crumbs.

In many of the smaller home gardens the need for producing vegetables continuously makes it difficult, if not impossible, to maintain the soils in good physical condition and it is in these gardens that for the best results it is imperative that additional organic matter is added to the soil each year.

Successful commercial gardeners are aware of the need to maintain the physical condition of their soils. Commercial growers who cultivate small areas intensively almost invariably make heavy applications of organic manure for every second crop besides growing green crops whenever possible. On the larger areas the physical condition of the soil is usually maintained by frequent heavy green cropping. Alternatively on the larger holdings areas are sown rotationally in grass. With a grass cover the soil surface is protected from the erosive effects of sun, wind, and rain and a thick mass of roots permeates the top 18in. to 24in. of soil, retarding the leaching of important plant food elements by absorption and effecting an improvement in the physical condition of the soil by building up organic matter.

Improvement of Cultivation

Surface cultivation to destroy weeds is very important during February and in general a tool such as a push hoe that has a sharp blade that skims just below the soil is better than a tool such as a cultivator that relies on teeth for weed killing. The toothed or tined cultivator or chop hoe is of value where the weeds are large or the ground surface rough.

The hoe is one of the most useful garden tools and for most effective weedkilling full use should be made of

[*Sparrow*

Well-grown crops of lupins provide some nitrogen as well as fibrous organic matter which makes an important contribution to soil tilth.

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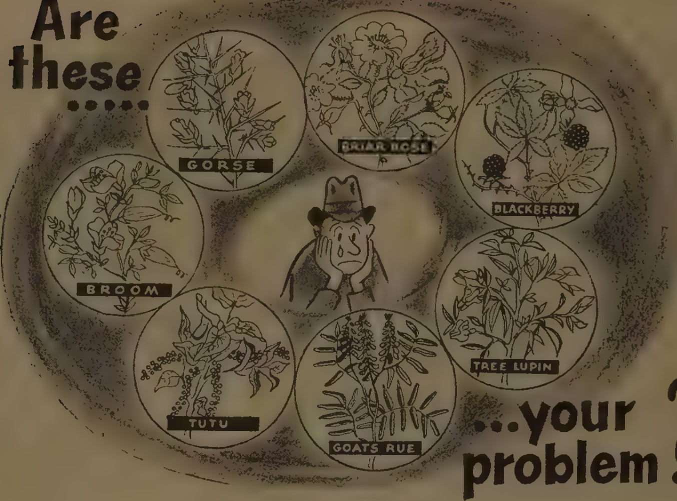

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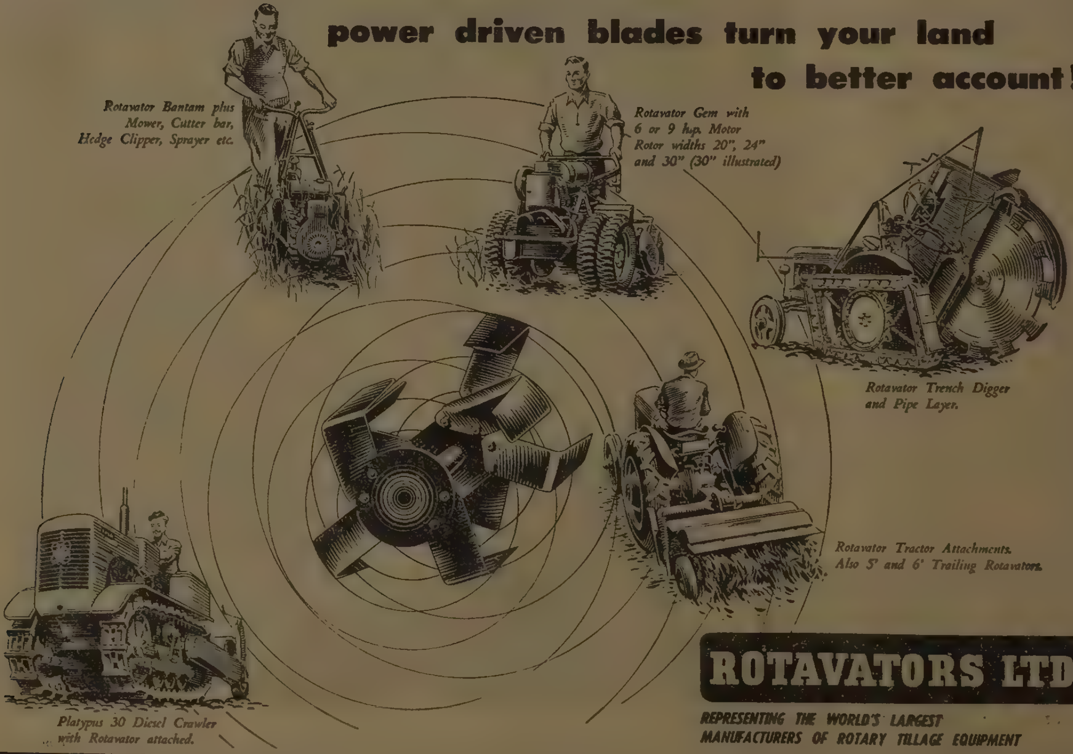

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[Photo News

Compost is one of the most useful sources of organic matter and no household or garden refuse that will rot down readily should be burnt unless it contains diseases that are very difficult to destroy.

it on hot days when soil conditions are dry. It does not matter greatly in the smaller home gardens whether a push hoe or swan-necked or chop hoe is used, but the hoe should be clean and sharp. A few strokes of a sharp file is enough, if given regularly, to keep even the hard-worked hoe sharp. On the push hoe only the cutting edge which lies uppermost when the hoe is being used and on the chop or swan-necked hoe only the edge of the surface which faces the operator should be filed or ground (see lower left and lower right diagrams on page 70). It is desirable in any but the smallest of gardens to have both types of hoe.

[Green and Hahn

Seaweed makes a useful garden manure and home gardeners who live near a beach are often able to gather it for composting or digging into their garden soil. The bull kelp shown is frequently cast up on New Zealand beaches after a storm.

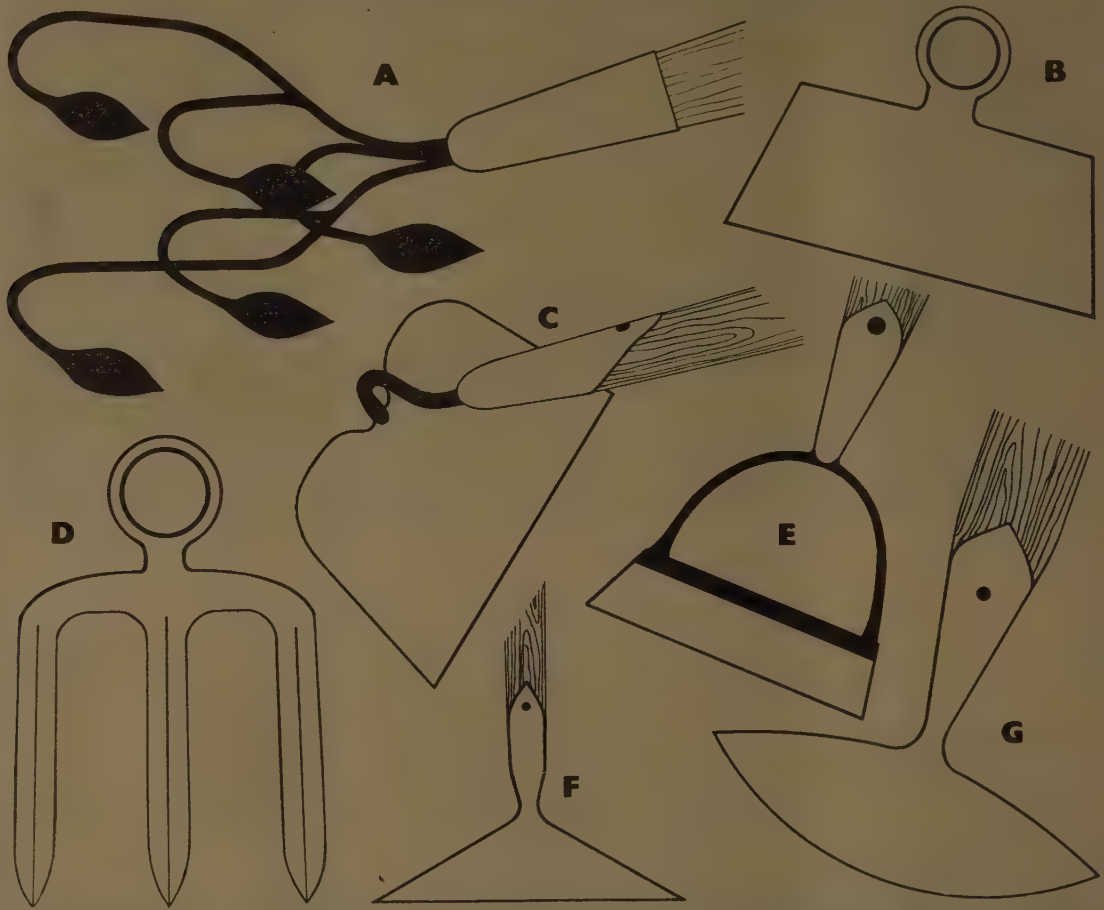
The push hoe is specially useful for cultivating between closely planted rows of vegetables such as onions, carrots, beets, and radishes. If it is sharp and wide enough and the blade is held at the correct angle, small weeds can be cut in one sweep simply by pushing the hoe along between the rows. The chop hoe is useful for rough ground where drastic action is necessary and for big weeds or for scraping off weeds on firm, level soil. It is of some value in loosening soil between rows in heavy ground that has become excessively compacted by being walked on, but it is not as useful for that as is the tined cultivator (upper left diagram on page 70), which is particularly useful for loosening soil between rows of crop plants.

The value of surface cultivation in improving plant growth is one of the most controversial aspects of vegetable production. Gardeners of 20 or even 10 years ago were almost unanimous that cultivation or loosening the top 2in. to about 4in. of surface soil between crop plants—quite apart from cultivation for weed killing—was beneficial to all garden crops.

The theory broadly was that a blanket of loosened soil acted as a mulch and was of great value, as it reduced capillary movement and evaporation of moisture, improved aeration and nutrition, and raised soil temperatures.

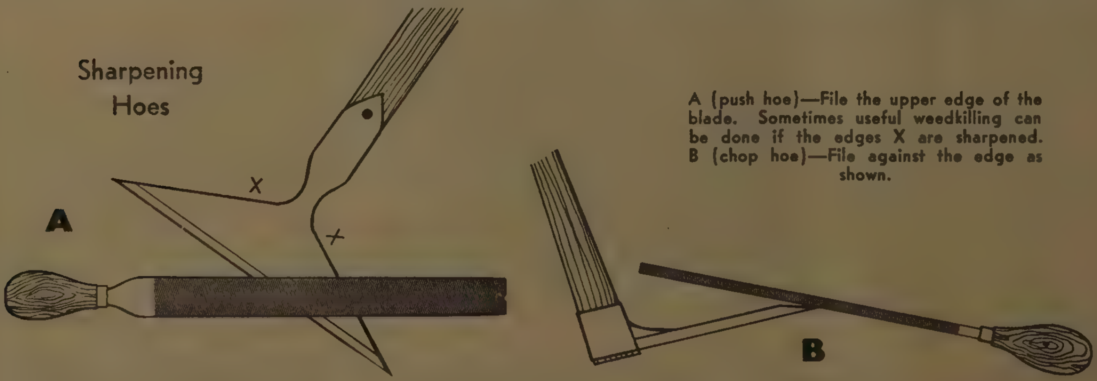
The theory is now less widely held, as researchers have shown that increases in aeration, soil temperatures, and soil moisture compared with conditions in uncultivated soils are at

Hoes and Cultivators for the Home Garden



A—Tined cultivator. There are several types, some with detachable prongs. B and C—Chop or draw hoes. D—Tined cultivator or Canterbury hoe. E—Push or Dutch hoe. It is similar in principle and function to the triangular or torpedo push hoe (F and G). Wide bladed push hoes are preferable to those with narrow blades. F—Triangular or push hoe. Many home gardeners walk backward when using the push hoe, but commercial gardeners usually push the hoe in front as they walk down the rows. G—Push hoe which is sometimes known as a torpedo hoe. It will pay the home gardener to select one of the well-designed types, as in these the angle of the blade to the handle makes for easy, efficient working and the blade is of good steel which holds an edge for a considerable time.

Sharpening Hoes



A (push hoe)—File the upper edge of the blade. Sometimes useful weedkilling can be done if the edges X are sharpened. B (chop hoe)—File against the edge as shown.

[*Sparrow*

Cucumber plants that are making good growth tend to straggle untidily. The vines are best trained tidily as they grow.

best very small and in many instances non-existent. The value of the soil mulch type of cultivation depends largely on the soil and the kind of crop grown. Plants with very small root systems such as celery, beetroot, and onions are more likely to benefit from it than plants with stronger and more widely spread root systems.

Work for February

Though there is some variation according to district and situation in general there are only four good growing months after Christmas and with the disruption in garden work so often caused by the Christmas and New Year holidays many gardens are neglected during the greater part of January and important garden work is left until February. This loss of one of the best growing months may seriously reduce the period for good growth in southern districts, particularly of the winter greens which include leeks, savoy cabbage, winter cauliflower (broccoli), and silver beet.

Winter greens should be regarded by home gardeners as among the most important crops in the garden, as with forethought they can be grown so that produce can be harvested from them from late autumn through winter until late spring, when vegetables are most likely to be scarce and dear.

As it is late in southern districts and the less favourably situated gardens elsewhere for the setting out of winter greens, they should be planted without delay if this work has not yet been done. Success apart from weather will depend largely on soil fertility and the use of healthy well-grown plants.

Beetroot

In most districts February provides the final opportunity for sowing beetroot to mature before winter. There are several types of beetroot, flat or turnip-rooted, globe (round), intermediate, half-long (obelisk) or stump-rooted, and long. In most northern districts February sowings usually produce good crops if the situation is favourable and soil conditions are good, but in districts where autumn temperatures fall more quickly and frosts are earlier seed should be sown in favourable situations not later than the beginning of February and a quick maturing, flat or turnip-rooted variety should be chosen.

Beetroot seed germinates in a wide range of soil temperatures, though if low temperatures are experienced before plants are well developed they may produce seed stalks instead of swelling the root further. Quality beetroot can be produced only by rapid growth, which in turn is largely dependent on soil fertility. In particular the nitrogen in the roots is in direct proportion to the amount supplied in the soil, and soils that produce the largest yields also produce plants that have the largest proportion of water to dry matter and so are most succulent.

Beetroot requires a sunny open situation, as it rarely thrives if shaded, even if soil conditions are otherwise perfect. Soil and manurial requirements are similar to those for carrots. Seed should be sown ½in. deep, about 10 to 15 seeds to the running foot, in rows 12 to 15in. apart. Plants should be thinned to 2in. to 3in. apart as soon as they can be handled.

Carrots

A late sowing of an early variety of carrots can be made in the warmer districts in February. Late sowings are sometimes less subject to the attack of the carrot aphis and the carrot rust fly and are therefore preferred in some districts. In southern districts the situation and autumn weather must be favourable and the seed should be sown without delay in soil that is in good condition and worked to a fine tilth.

Many home gardeners have difficulty in growing carrots, though in most gardens carrots should be one of the most productive and important crops, as they can be used at various stages of maturity and if sowings are suitably spread, they should be available in most good-sized gardens during most of the year. The food value of the carrot is high and its vitamin content important in nutrition.

Carrots are not difficult to grow, but soil must be friable, moist, and well drained, and the plants must be kept free from insect pests. Light sandy loams produce the smoothest and straightest carrots, but all good loams apart from the heavier clay loams can be improved to produce satisfactory crops. Peat soils are usually highly productive.

Difficulty is commonly experienced by home gardeners in growing carrots in the older, sometimes rather light soils that have been worked for many years without having had much organic matter such as compost or farmyard manure applied to them. Trouble is commonest in the smaller garden where cropping is usually continuous and good crop rotation with adequate green cropping is difficult. Carrots grow well in soils that were heavily dressed with organic manure for the previous crop. The application of heavy dressings of organic manure just before sowing is not advised, though results may be satisfactory if the manure is well rotted and mixed throughout the root area. The incorporation of lumpy masses of fresh or only partly rotted manure is especially to be avoided, as local conditions may become highly acid and the carrots coming in contact with the manure may become forked or distorted.

Soil Preparation

Soil preparation for the seed-bed should be thorough. Lumpy soil should be pulverised until a fine tilth is obtained.

Results are likely to be better on most soils if mineral fertiliser is used

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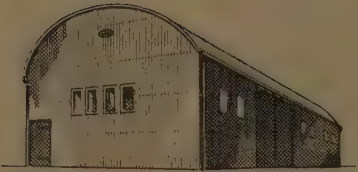

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to supplement the organic manure in the soil. A complete fertiliser—one made up of nitrogen, phosphate, and potash—is likely to give best results on most soils, but good responses are obtained on many New Zealand soils from superphosphate alone. Superphosphate can be worked in at the rate of about 2oz. to 3oz. to the square yard during the final cultivation.

Carrot seed is rather small and should be sown only ¼in. deep in rows 12in. to 15in. apart at the rate of about 15 to 20 seeds to each running foot of row. On soils that tend to form a crust after rain the soil over the seed should be kept hoed to break the crust and to facilitate the emergence of the tiny seed shoots.

Control of Aphides

Aphides or green fly are commonly the most troublesome pests on carrots, and home gardeners sometimes have difficulty in detecting them. The plants should be examined regularly from the seedling stage so that spraying can be begun as soon as the aphides appear. Usually the first and most readily noticeable sign of aphides is the presence on the carrot foliage of tiny whitish or greyish flecks rather like cigarette ash which are the cast-off skins of the aphides. If the plants are young, the presence of just a few aphides soon saps their vigour and in warm weather the leaves even of large plants quickly lose turgidity and if infestation is heavy, the plants become flaccid and growth may cease.

Aphides can be controlled by spraying on a warm still day with nicotine sulphate 1 fl. oz. (approximately 7 teaspoons) to 5 gallons of water, plus a little soap or lime to activate the nicotine. Alternatively, H.E.T.P. can be used at the same strength but without soap or lime.

Cucumbers

In most districts cucumber vines should be in bearing in February. The cucumber grows quickly in warm conditions if the soil is in a fertile and friable condition. Soil temperature is very important, as cucumber plants make little growth at soil temperatures below 50 degrees F. and a higher temperature is desirable. Light soils that have been well mulched or have had plenty of organic matter worked into them are excellent for cucumbers if moisture is adequate and drainage is good.

Cucumbers are more tender than tomatoes or sweet corn and as the leaves are readily scorched by sun or wind in exposed situations, they should be grown between rows of taller plants such as peas or sweet corn which will provide some shelter. Cucumbers are usually grown either in hills or groups of several plants set fairly closely together, in single rows, or in large gardens occasionally in double rows. The shoots should be trained to facilitate access to the plants. Only shallow hoeing around vines should now be necessary and if this is done regularly, weeds will be destroyed when they are small.

Except where the soil is very fertile the yield of cucumber plants is usually improved by a topdressing of sulphate of ammonia or blood and bone or where conditions are dry by applications of liquid manure, which can be made from animal manure or sulphate of ammonia at 1oz. dissolved in about 2 gallons of water.

[*Sparrow*

Conditions must be good to produce large, crisp, firm-hearted lettuce.

Celery

Though it is useful for soups and stews, celery is most popular as a salad vegetable. Most home gardeners like to set out plants as early as possible and though plants can be set out earlier where temperatures are high enough, December and January are the preferred months for planting. Later planting is only practical where autumns are mild. Home gardeners sometimes defer planting until after the holidays so as to be able to attend to the plants throughout their growing period, because for good growth celery should have a continuous and fairly high supply of moisture and also because in most districts regular spraying is necessary to keep the plants free from leaf diseases. However, temperatures are of first importance and if they are not high enough, plants will fail.

Home gardeners usually buy young celery plants from seedsmen or nurserymen, as the seedlings of self-blanching celery need to be raised in consistently higher temperatures than prevail in most districts without the aid of a glasshouse or heated frame. Varieties of self-blanching celery differ according to their heredity, but with most varieties seed stalk development is initiated if they are subjected for a week or more to temperatures of from 35 to 50 degrees F.

Manures

Though celery is more tolerant of insufficiencies of moisture, nutrients, light, and space than it is of low temperatures, a good deal of skill is needed to grow self-blanching celery well, as it needs a rich soil, ample moisture, and good drainage. Organic manure such as farmyard manure or organic fertilisers such as blood and bone are preferred, but where organic manures are not available in sufficient quantity it is usual to supplement them with mineral fertilisers. Nitrogen and phosphates are usually applied and give improved growth on most soils. Potash is less often applied, though it is probable that it would improve quality on many soils.

A complete and balanced fertiliser made up of 2½ parts of sulphate of ammonia, 2½ parts of superphosphate, and 1 part of sulphate of potash applied at about 2oz. to 4oz. to the square yard according to soil fertility should promote good growth.

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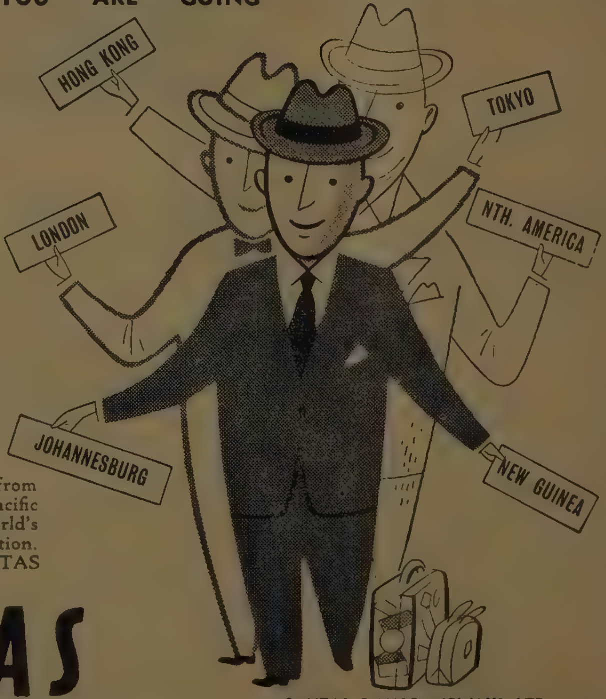

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[Sparrow

Peas can be grown successionally so that pods can be harvested throughout most of late spring, summer, and autumn.

Manure should be mixed into the top few inches of the soil before the plants are set out; deep placement is not advisable, as the roots of celery remain near the surface. Soil moisture is as important as soil nutrients in the growing of self-blanching celery, and to facilitate watering in soils that may dry out plants can be grown in shallow trenches.

Non-self-blanching Types

The older types of celery which are not self-blanching are usually considered less difficult to grow than the self-blanching types and are considered by many to have a superior flavour and texture. A well-grown head of celery should be made up solidly of large, thick-fleshed, succulent leaf stalks and the characteristic nutty celery flavour should be strongly developed.

Planting in a trench is specially favoured by those who blanch the older non-self-blanching varieties by moulding the earth up the stems, but it is practicable only where the soil is deep and well drained and does not contain too much organic matter. Self-blanching celery is more subject to leaf spot disease than the non-self-blanching kind. Where the disease is prevalent plants should be sprayed with a copper fungicide such as Bordeaux mixture, or copper oxychloride at intervals of about 7 to 14 days. Control of the disease may be obtained with less frequent spraying where humidity is low or a good coverage of spray residue remains on the plants for a fairly long time.

Lettuces

During the warmer part of the year lettuce is grown in practically all home gardens and with seasonal sowing or planting it can be grown in most districts to be available throughout the year. Lettuce is a crop that must be grown quickly if the leaves are to be crisp. Slow growth or checks to growth cause the flavour to be bitter and though varieties of lettuce have been developed that have considerable tolerance to hot weather, high-quality lettuce can be produced consistently only where the temperature of the soil and the air is moderately cool while the crop is maturing. Fluctuating high and low temperatures do not promote good growth. With most varieties very high temperatures favour early seed head development, bitter flavour, and poor hearts.

Lettuce sown even early in February is unlikely to develop good heads before winter in southern districts or in unfavourable situations elsewhere unless soil conditions are very good. Lettuce matures in from about 2 to 5 months according to growing conditions and varieties, but conditions have to be exceptionally favourable to produce good lettuces in 2 months. It is not advisable unless lettuce is in considerable demand to make large sowings which may not mature until so late in the season that heavy frosts can be expected.

Though lettuce will tolerate fairly heavy frost, if it is severely frosted at or near maturity, the outer leaves become damaged and the plants subject to slimy rotting. Maturing plants will grow very little during continuous frosty weather and though the heads may become solid, they will remain small and may suffer injury that makes them wasteful in preparation for the table. In February planting rather than sowing will therefore be advisable in many districts.

Manuring

The root system of lettuce is relatively shallow and though excess water is not desirable, plants should be set out in a moist soil that does not dry out. Practically all soils are improved for lettuce growing by the addition of organic matter. The amount needed varies with the soil type. Loss of organic matter owing to decomposition is rapid in light soils, but heavy soils also need organic matter, as it improves aeration and water movement.

Well-rotted farmyard manure gives excellent results, but very heavy dressings, particularly when the weather is most favourable for growth, may result in loose heads. Where sufficient farmyard manure, compost, or similar material cannot be obtained soil can be improved by growing a green manure crop and digging it in early enough for it to rot down before the lettuce is set out. Unless rotting is fairly complete before the plants are set out growth may be checked through depletion of the nitrogen in the soil by the bacteria that cause decomposition. On very heavy soils where the danger of depletion of the nitrogen supply may be outweighed by the advantage of improving the physical condition of the soil it may be advisable to allow the green crop to mature fully before digging it in so that it contains much fibre which when incorporated into the soil is likely to be effective for a longer period.

If additional fertiliser is needed, blood and bone is likely to give good results on most soils. Alternatively a complete mineral fertiliser can be made up by mixing 2½ parts of sulphate of ammonia, 2½ parts of superphosphate, and 1 part of sulphate of potash. The complete fertiliser is much more concentrated than blood and bone and it can be applied at about half the rate of blood and bone. Rates of application vary from about 2oz. to 6oz. to the square yard according to the fertiliser and the fertility of the soil. In home gardens nitrogen

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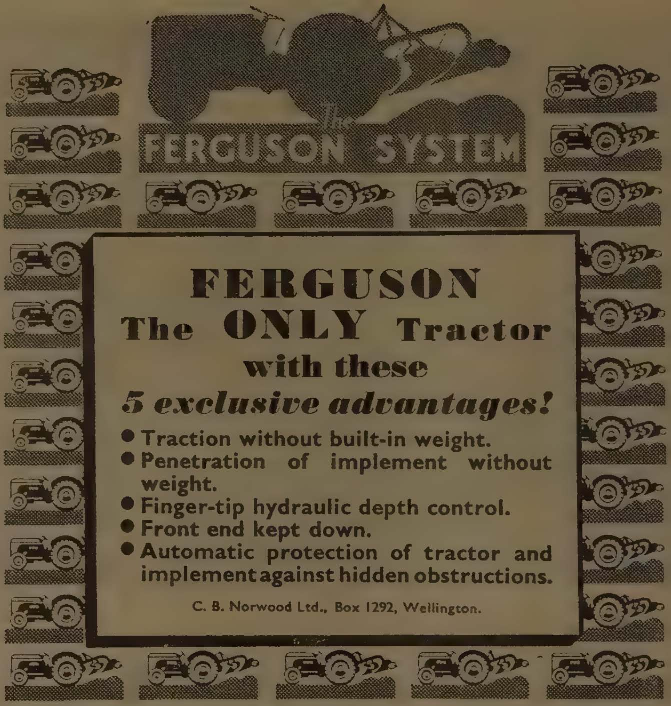

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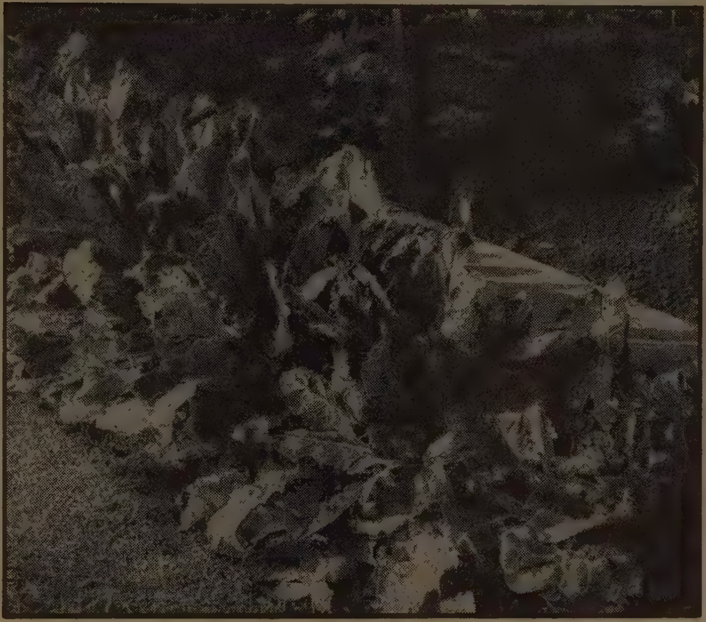

Spinach beet has smaller leaves than silver beet or Swiss chard, but it is one of the most useful garden vegetables.

is usually the limiting element in growth of lettuce. However, too much nitrogen may result in poor hearts and loose leaves.

Soil should be worked to a fine tilth for sowing, as lettuce seed is small and germination relatively weak. Seeds should be sown thinly (as the first thinning should leave plants about 6in. apart) about ¼in. deep in rows 12in. to 15in. apart.

Popular varieties include Webbs Wonderful and Imperial 615.

Peas

Garden peas can still be sown in the north, though in most southern districts it is rather late for peas sown even early in February to mature before winter. Except in the warmer districts sowing should be confined to sheltered situations lying well to the sun and where the soil is well drained and in good condition.

An early or quick maturing variety should be chosen. In favourable northern districts early maturing peas can be sown usually until about the middle of the month, but in general early sowing is recommended.

Peas are hardy and grow well in cool, but not cold, weather. They are one of the best crops for soil improvement, as they leave a considerable weight of organic matter in the soil that is specially valuable because of the nitrogen gathered from the air which the peas fix in the nodules of their roots. One contributory factor to the failure which sometimes occurs when peas are grown for the first time on some of the drier soils that lack organic matter is an insufficiency of the nitrogen-fixing bacteria needed by them. Garden peas grow in association with the same kind of nitrogen-fixing bacteria as broad beans, lentils, sweet peas, and field peas.

Manures

In good soils peas do not need heavy fertiliser dressings and commercially, both in New Zealand and overseas, a very moderate dressing of superphosphate alone has given good results on a wide range of soils. Garden peas are fairly tolerant of soil acidity and usually grow well in fairly acid soils, but moderate applications of lime, about 3oz. to 4oz. to the square yard, are advisable on the more acid soils.

Injury often results where fertiliser is applied in the drills with the seed. It is best applied to the soil 2in. to 3in. on either side of the seed row or at least 1in. under the seed. The fertiliser can be applied in a drill taken out with a hoe and partly filled in before the seed is sown. Peas require well-drained, fertile soil and in any but the most fertile soils they repay soil improvement measures. Deep digging of heavy soils and the incorporation throughout the soil area of moderate quantities of well-rotted organic matter are advised. Surface or near-surface applications are not only liable to cause seed injury but may encourage shallow rooting, which is specially to be avoided where conditions are liable to become dry.

A supply of nitrogen in the soil helps young plants to become established, but most soils that have been kept in good condition by regular dressings of well-rotted organic matter should be adequately supplied and on most home garden soils superphosphate alone at 1oz. to 3oz. to the square yard is likely to give satisfactory results.

Seed Sowing

Seed can be sown at about 10 to 15 seeds per running foot, in drills taken out with the corner of the blade of a chop hoe, or a broad drill can be formed with the chop hoe or spade and the peas sown 1in. to 2in. apart throughout it. Seeds should be sown about 1in. deep except in the lighter soils that dry out readily, where it can be covered to a depth of 1½in. to 2in. If the drills are taken out a little deeper, when part of the covering soil is put back the hollow left will serve to mark the row and facilitate watering. Later the peas can be earthed up to keep the roots cooler and in windy conditions to hold the plants more firmly.

For dwarf varieties rows should be at least 18in. apart. William Massey is one of the best varieties for sowing in February.

Pea crops coming into bearing should be watered if conditions are dry. On soils that dry out quickly a mulch of lawn clippings or similar material may be of value. Though peas grow best in moist, well-drained soil it is not usually advisable to water the soil after sowing until the plants are well established, as germination losses are usually much heavier in wet soils.

Mildews

In the dry weather which is often experienced in February and March and when considerable differences in day and night temperatures may result in heavy dews, peas are sometimes attacked by powdery mildew, which can be recognised by a greyish powdery coating that rubs off when plants are handled on leaves and other parts. The disease may cause yellowing or death of the plants.

Some control can usually be obtained by spraying or dusting with sulphur, but the disease is usually difficult to control when well established and where conditions favour it, and except to check an infection in the early stages spraying or dusting is usually of limited value in the home garden. Diseased haulms should be burnt immediately after the crop has been picked to prevent infection of subsequent crops.

Downy mildew, which differs from powdery mildew in that it occurs as a greyish-brown growth principally on the under surfaces of leaves and on pods, may also be troublesome. Diseased pods may contain spore masses instead of seed. Downy mildew occurs chiefly in moist weather and though spraying is rarely necessary, copper fungicides such as Bordeaux mixture or copper oxychloride give fairly effective control. Diseased haulms should be burnt and crop rotation practised.

Collar Rot

Collar rot is probably responsible for more losses in pea crops in home gardens than is any other trouble. It may be caused by one or more of at least three different organisms which are capable of remaining in the soil in a dormant state for 2 or 3 years even without a suitable host plant.

Preventive measures are very important and include the use of clean unmarked seed, dusting seed with organo-mercury or copper or non-metallic seed dusts (which may be obtained from most seedsmen), burning diseased pea vines, and growing

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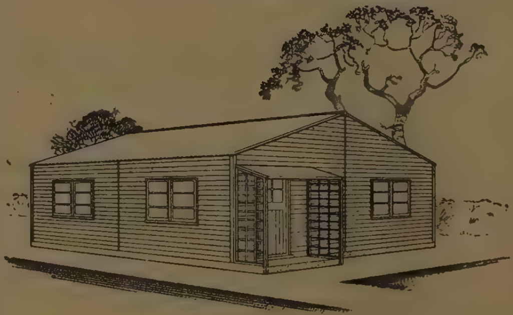

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crops only on well-drained land where long rotations can be practised.

[*Green and Hahn*

Cabbage seedlings should be sprayed regularly where pests and diseases are likely to be troublesome.

Silver Beet and Spinach Beet

Silver beet is also called Swiss chard or sea kale beet and good strains if well grown are particularly robust with strong rooting systems and large succulent leaves. Spinach beet or perpetual spinach beet produces more numerous leaves that are not as large as those of silver beet but can usually be plucked from the plant for a longer period.

Both silver beet and perpetual spinach beet are excellent as stand-by crops, particularly in the smaller home gardens, as in most conditions they bear for a longer period than any other greens. In addition, because of their vigour they succeed in most soils and they are not usually affected by root diseases.

Seed should be sown without delay in any but the most favourable districts to enable plants to make as much growth as possible before winter. Alternatively in the cooler districts plants should be set out. They are usually available from seedsmen. Seed should be sown ½in. deep in rows 15in. to 18in. apart. Most of the listed varieties are good.

Spring Cabbage

Cabbage is one of the most valuable garden vegetables, as it is not only nutritious but grows well in a wide range of soils and in good conditions is one of the heaviest yielding crops.

Though in northern districts or in sheltered situations spring cabbage can be grown from seed sown in March, February is the preferred month for sowing. Where soil and situation are not good seed should be sown as soon after the end of January as possible. It is not usual to sow seed of spring cabbage before the end of January because if seedlings are set out too early, plants mature too quickly. If seed is sown early and plants are left in the seed-bed until the usual setting out time, they may become too large to transplant well. Where winter temperatures are low and very large plants are set out they are specially liable to run to seed.

Cabbage is a cool climate vegetable, but the seed germinates and the plants grow well in a fairly wide range of temperatures if the physical condition of the soil is good and it contains adequate moisture and plant nutrients.

Protective Sprays

Many home gardeners have difficulty in raising cabbage seedlings for setting out for the spring crop. The seed usually germinates quickly, but seedlings are liable to be attacked by fungous diseases such as mildew and by insect pests such as caterpillars, aphides, or thrips. Regular spraying with Bordeaux mixture or copper oxychloride will control most fungous diseases and if a suitable insecticide is applied, insect pests can be controlled. Cabbage seedlings are difficult to spray because the leaves have a smooth, almost greasy surface which is difficult to wet. In the early stages, too, the leaves are rather delicate and easily depressed by the pressure of sprays.

Proprietary wetting agents, which are usually compounds similar to detergents sold for household dish washing, aid the wetting of the leaves if added to the spray. If the spray is applied under pressure through a fine nozzle so that spray drifts as a mist, the under sides of most of the leaves should be covered with spray deposit.

Caterpillars and usually thrips are readily controlled by spraying with D.D.T. It can be used alone or added to a fungicidal spray. Thrips often check young plants and little is done about them because they are not seen unless the plant is examined closely. Thrips are minute cigar-shaped creatures up to about ⅛in. long. They are dark in the adult stage and have wings, with which they fly short distances if disturbed.

The immature stages are wingless, green or light yellow, and do not move readily. Thrips rasp the under surfaces of cabbage leaves and denude them of

Though the keeping quality of onions depends on the variety and on manurial treatment, it is also affected very largely by the care taken in harvesting or drying. A spell of fine weather is essential for the proper drying off of the bulbs, unless a suitable drying shed or rack is available.

their green colouring matter and so reduce the leaf function.

Aphides, usually the cabbage aphis, which is greyish and rather mealy, may also attack cabbage plants. Among any group of grey aphides, particularly in dry conditions or toward the end of the season, a number are usually winged. Under dry conditions and in heavy infestations it is often possible if the colony is observed closely, to see tiny wasps not much larger than the aphides which parasitise the aphides.

Aphides and to a great extent thrips can be controlled by spraying on a hot, still day with nicotine sulphate at 1 fl. oz. to 5 gallons of water (plus a little soap or lime to activate the nicotine). Alternatively H.E.T.P., which will also give good control of thrips, can be used at the same strength but without soap or lime.

Varieties

Flower of Spring and Enfield Market are the most commonly grown varieties except in some of the northern districts of the North Island, where Jersey Wakefield and the summer cabbages Green Acre and Golden Acre are also favoured.

Several other good varieties are listed in most catalogues, and for the home gardener who has sufficient ground and is interested in improving his crop a trial of a new variety is well worth while. It may specially suit his conditions and even if it is not an improvement, it may mature at a different period and contribute to the continuity of his supply.

Onions

The onion is usually considered one of the most nutritive vegetables. In most districts the crop should now be mature or nearly so and as the ripening and hardening of the bulbs are important factors in onion growing because of their effect in improving the keeping quality of the bulbs and making them more resistant to storage diseases, the onion bed should not now be watered, as wet conditions are likely to prolong leaf and root growth.

The bed should be kept weed free. Strong weed growth harbours pests and diseases and reduces the efficiency of sprays. It is important, if the onions are to be kept, to avoid damage during lifting.

A common practice among both commercial and home gardeners is to bend over the tops of the nearly mature onions to hasten the dying down of the tops. Usually rows are paired with the tops pressed over and laid to the centres of the double rows. Though it gives the onion bed a tidy, workmanlike appearance it is unlikely, judging from experimental work, that this furthers the dying down of the tops; it is probable that it reduces yields slightly. If conditions in the field are unfavourable for drying, onions should be harvested as soon as the tops are as dry as local conditions are likely to permit and final drying done by putting them on airy racks made of battens or laths or by spreading them out on wire netting in dry, well-ventilated shelter.

Many home gardeners trim off the tops of onions close to the bulbs as they harvest them, though it is not essential and may even be a disadvantage, as the top tends to cushion the bulb during handling. If trimming is done, it is particularly important that the onions should be sheltered from the direct rays of the sun. They should be covered with the trimmed tops, as otherwise the bulbs are likely to suffer sunburn or sunscald. When bulbs are sunscalded the outer tissues become bleached and usually collapse and soft rot may follow.

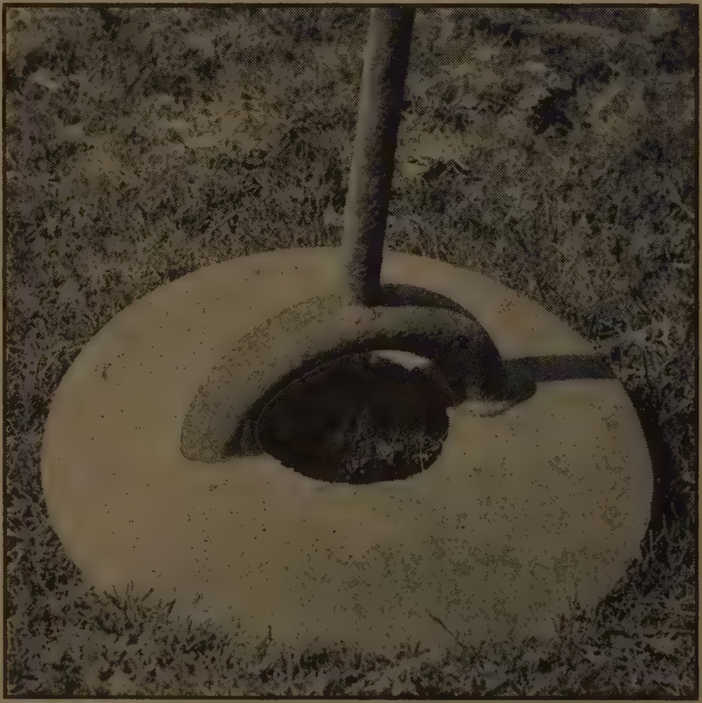
The green leaves of growing onions are liable during February to be attacked by thrips, which cause silvering of the foliage of onions by rasping the green colouring matter from the surface of the leaves. This reduces the power of the leaf to manufacture the substances which are essential to growth. Thrips can be controlled by spraying on hot, still days with nicotine sulphate 1 : 800 (1 fl. oz.) to 5 gallons of water plus a little soap or lime to activate the nicotine) or by spraying with H.E.T.P. or D.D.T.

Shallots

Shallots should now be mature in most gardens and can be harvested as soon as they are dry. The tops are not usually as large as those of onions and usually need not be trimmed, as they protect the bulbs in storage and retard the progress of rots that may develop. Shallots are generally easier to grow than onions and deserve to be grown more widely, particularly on the horticulturally poorer soils. Their cultural requirements are in general similar to those of the onion, but as they are not generally grown from seed but from off-shoots of the parent bulbs, they are much less exacting in their needs. The off shoots root readily if they are pressed on to the soil and are more tolerant of adverse conditions than are young onions.

The bulbs of the large-bulbed varieties of shallots are as large as the bulbs of some of the smaller-bulbed varieties of onions and few can distinguish between the flavour of shallots and that of onions. The bulbs of some varieties of shallots are very small and are well suited to pickling, but they need more skinning and trimming in culinary use than do most varieties of onions. The smaller varieties of shallots have the merit of being particularly hardy, succeeding in adverse conditions and being very resistant to storage troubles.

An Efficient Sheep Dip Stirrer



AN efficient sheep dip stirrer has been made from a used disc blade welded to a shaft of piping. A curved section of ¾in. water pipe was welded on to the disc and a handle of ½in. pipe welded to the centre of the curved pipe attached to the disc. This type of stirrer is durable and can be made easily from scraps of metal.

—*R. G. BUCHAN, Livestock Instructor, Department of Agriculture, Gore*

Recent Research Work

FERTILISERS

MUCH of the experimental work in soil fertility of the Extension Division of the Department of Agriculture is concerned with the response of pasture to applied nutrients. Such responses depend primarily on soil type, provided the pasture species capable of responding are present in the sward. The diversity of soil types requires that an extensive series of experiments be laid down for any project involving topdressing, and the Division has annually about 800 topdressing trials under observation. These notes summarise the results from a series of trials with common salt in the Auckland Land Districts and report a vanadium response in Northland and a potash response in Southland.

COMMON SALT KAINIT, a crude salt containing 12½ per cent. of potash, was an important potassic fertiliser in the early days of pasture topdressing. Later, and up to the beginning of the Second World War, during which potash importations virtually ceased, 30 per cent. potash salts were the cheapest form, based on potash content, that could be imported and were the main potassic fertilisers used on grassland. This fertiliser comprised the crude salts fortified with the refined muriate of potash to bring the potash content from 12½ per cent. up to 30 per cent. Probably because of increased freight charges since the end of the Second World War, little or no 30 per cent. potash salts or kainit have been imported. In deciding to import only refined potash the firms handling potash have no doubt been guided mainly by the potash content and have taken little account of the possible manurial value of the chief impurity (common salt) or the minor impurities (magnesium sulphate, magnesium chloride, and calcium sulphate). Instructors in Agriculture who carried out trials on grassland between 1930 and 1940 used 30 per cent. potash salts almost entirely and many of them consider that 2cwt. of this material gave better responses than 1cwt. of muriate of potash, which contains about 60 per cent. of potash with little or no impurities. Consequently, and because common salt can be bought fairly cheaply in New Zealand, 20 trials comparing the effectiveness of common salt with muriate of potash were laid down in 1952 and early 1953 in the Auckland Land Districts.

COMMON SALT AND MURIATE OF POTASH Plots were dressed with common salt alone and muriate of potash alone and in combination as follows:—

1. 1cwt. of muriate of potash.
2. 1cwt. of common salt.
3. 1cwt. of common salt plus 1cwt. of muriate of potash.
4. ½cwt. of common salt plus ½cwt. of muriate of potash.

Since common salt in some soils appears to release potash from the soil complex and make it available to plants, the trials were laid down on pastures growing on soils deficient in potash. It is a very high recommendation of the efficacy of soil analysis and of instructors' knowledge of soil requirements that a potash response was obtained on each of the trials from the potash applications. Responses of differing magnitude were secured on all the trials from both the salt and the potash, the latter proving on the average about twice as effective. In some of the trials the effect of the salt disappeared 3 to 6 months after application, but the response from potash continued. On other trials the effect was still noticeable from both the salt and the potash 12 months after application. Many of the trials were topdressed a year after being laid down and so the range of time of the response could not be determined. On two trials, however, there were still responses both to salt and to potash 18 months after application. From these trials it would appear that consideration can be given to the use of common salt on pastures on the soil types under review. If this is done, some reduction may be made in the amount of potash used, but potash should not be omitted from the topdressing programme. Salt should not be applied at more than 3cwt. per acre or it may severely burn the pasture. —*J. E. BELL*

* * * *

VANADIUM TWO observational trials laid down in the Kaitaia district have given distinct responses to vanadium as well as to molybdenum. Both of these elements are found in basic slag in variable quantities, vanadium usually being present in much the greater amount. For this reason vanadium was included in trials designed to examine possible reasons for the good responses to basic slag which had been secured on certain soil types in this area.

Observations on the trials have indicated that superphosphate plus vanadium or superphosphate plus vanadium plus molybdenum are giving better responses than basic slag. This applies even on those plots where the rates of phosphate and the minor elements applied per acre were such as to give a dressing equivalent to that of the basic slag. It is possible that heavier applications of vanadium will be necessary for maximum responses and this will be investigated with a survey of responses to vanadium on all soils known to respond well to basic slag.

—*E. G. STAINTON*

* * * *

POTASH THE use of potassic fertilisers is increasing in Southland and many excellent responses have been obtained. Several trials incorporating potash at various rates are at present being carried out on a variety of soil types. In one trial the results have been outstanding. This trial is located near Seaward Downs, the soil type being classified as Edendale yellow brown earth. The paddock, which has been in grass for 2 years, was sown out with perennial ryegrass, short-rotation ryegrass, cocksfoot, and timothy, and white and Montgomery red clover. The previous topdressing consisted of 4cwt. of serpentine superphosphate in 1951 and 4cwt. of basic slag in 1953. The trial was laid down in August 1953 with a control plot and with muriate of potash applied at ½cwt., 1cwt., 2cwt., 3cwt., and 4cwt. per acre. One month later potash responses were evident, the response being most marked on the 1cwt. and 4cwt. plots. As the trial progressed potash responses continued with all rates of application, those from 3cwt. and 4cwt. applications being virtually equal, followed by the 2cwt. application, with the 1cwt. and ½cwt. applications showing the least response, though even these responses were most definite. During a period when the paddock was closed to stock the plots showing the most spectacular potash responses carried a dense cover of vigorous grass and clover about 1ft. high. The growth on the control plot, on the other hand, was almost nil, the only herbage being stalky, fibrous material. This trial is still under observation and future inspections should indicate the optimum rate of application. At the moment, however, all applications could be classed as giving a payable response, though the 4cwt. application appears excessive, as it has not proved superior to 3cwt. per acre. It is important to note that the pH level and phosphate level of this paddock are high and responses were not limited by deficiencies of lime and phosphate.

—*A. R. RANKIN*

* * * *

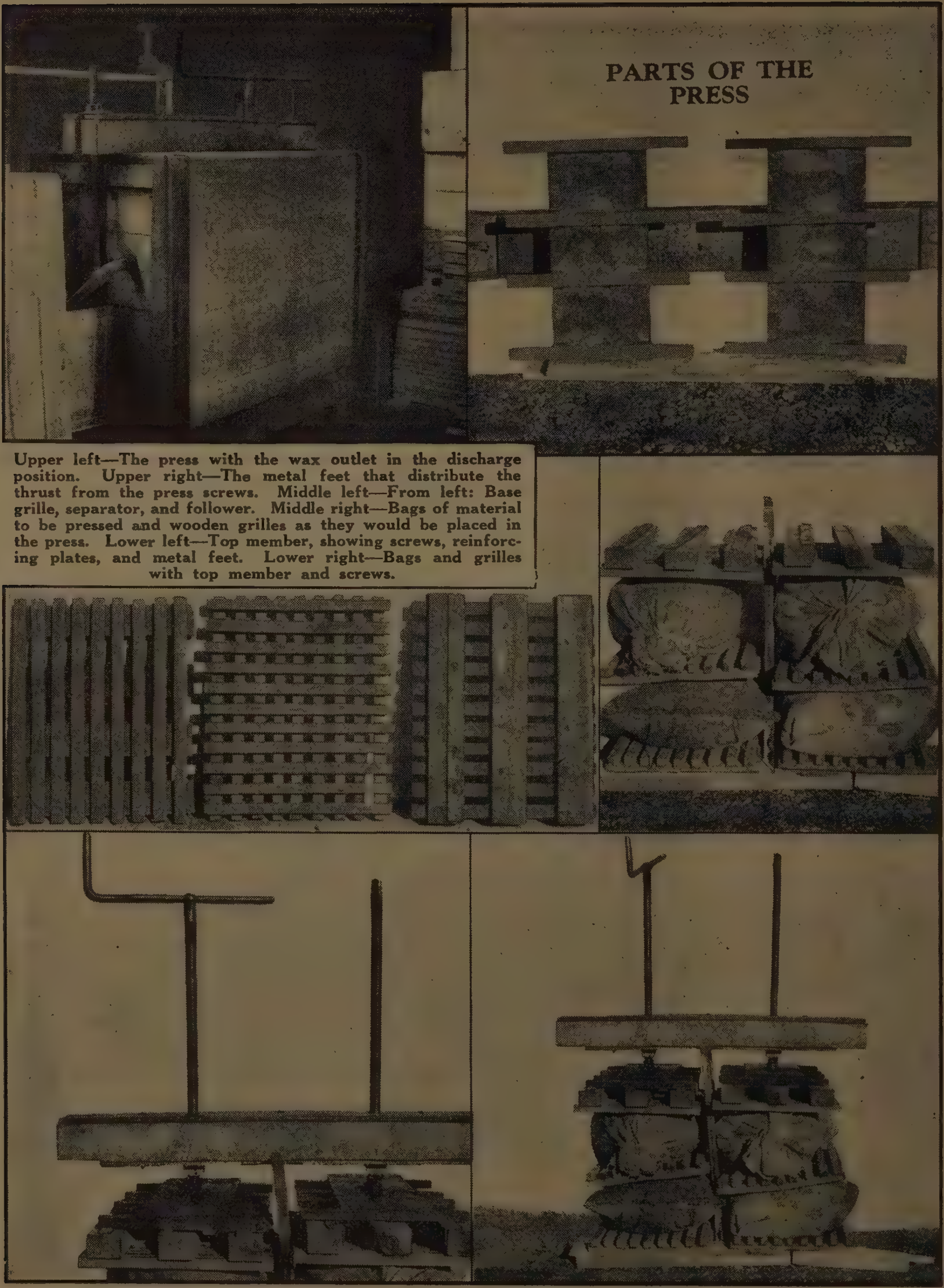
POTASH ON SAND COUNTRY THOUGH good results are generally obtained by the use of phosphate alone on sand country pastures, the use of potash with phosphate has given good responses on this soil type. On the heavier sand flats where the water-table is fairly high throughout the year it is possible to establish and maintain a high-class ryegrass-white clover sward. Phosphate dressings, usually at 3cwt. per acre, are necessary, however, and trial plots have shown that with the use of muriate of potash at 1cwt. per acre an appreciable increase in both the clover content and the growth-rate of the pasture can be seen. Where potash has been used alone the results have been disappointing, the clovers increasing in growth slightly but not appearing to be particularly vigorous. With phosphate, however, the result is marked and growth is very vigorous.

—*B. A. J. SMITH*

* * * *

DOUBLE SUPERPHOSPHATE DOUBLE superphosphate gives nearly always the same stimulation to growth as superphosphate when applied at equivalent rates of phosphorus. As double superphosphate contains only a trace of sulphur, it is inferior to superphosphate on sulphur responsive soils. In one trial it has been found that double superphosphate was less efficient than superphosphate in the absence of lime, but in the presence of lime, applied at only 3cwt. per acre, it was equal to superphosphate. An application of 2½oz. of sodium molybdate had the same effect as the 3cwt. of lime. It is thought therefore that the lower lime content of this more concentrated phosphatic fertiliser as well as the virtual absence of sulphur are facts which must be considered in its use. —*C. DURING*

PARTS OF THE PRESS



Upper left—The press with the wax outlet in the discharge position. Upper right—The metal feet that distribute the thrust from the press screws. Middle left—From left: Base grille, separator, and follower. Middle right—Bags of material to be pressed and wooden grilles as they would be placed in the press. Lower left—Top member, showing screws, reinforcing plates, and metal feet. Lower right—Bags and grilles with top member and screws.

Steam Press for Salvaging Beeswax

THE melting down of old combs is of necessity a regular task of the beekeeper, and the dross from most cappings melters needs further treatment for extraction of the last of the beeswax. A plant that will efficiently recover all of the wax available, such as that described here by I. W. Forster, Apiary Instructor, Department of Agriculture, Oamaru, is obviously a valuable asset to the commercial beekeeper.

THE wax that the beekeeper wishes to recover from old combs and from the refuse left by cappings melters is always intermingled with an assortment of substances broadly called slum-gum. This slum-gum is often of equal bulk to the wax itself.

Heat Application

The first requisite of any process is the application of heat to liquefy the wax. Beeswax melts at approximately 145 degrees F. It is often necessary to heat beyond this point to give a margin to allow for the inevitable cooling off during pressing in an open press, but overheating should be avoided as much as possible. Prolonged boiling with water or the fierce injection of steam tends to emulsify the wax and water to the detriment of the finished product.

Thoroughly heated old combs produce a heterogeneous molten mass that may be half wax and half slum-gum.

This slum-gum has many peculiar properties that tend to complicate its separation from the wax. It is of a gummy, resinous nature and quickly seals screens and strainers. Also much of its bulk consists of the cocoons that lined the cell walls of the old brood combs. These cocoons are of a porous spongy texture that tends to absorb the molten wax and firmly imprison it.

Methods of Salvage

Many methods have been devised from time to time in which hot water or steam carries the wax through strainers, thus separating it from the slum-gum. Many of these methods are reasonably satisfactory, but it is generally conceded that pressure applied mechanically is the most efficient way of squeezing out the wax and the press has been largely accepted as the most suitable device for salvaging wax.

As it is necessary to work quickly before the wax has time to cool, it has generally been found expedient to work in small units that can be quickly disposed of. The small Hatch type of wax press has accordingly found general favour and gives excellent results.

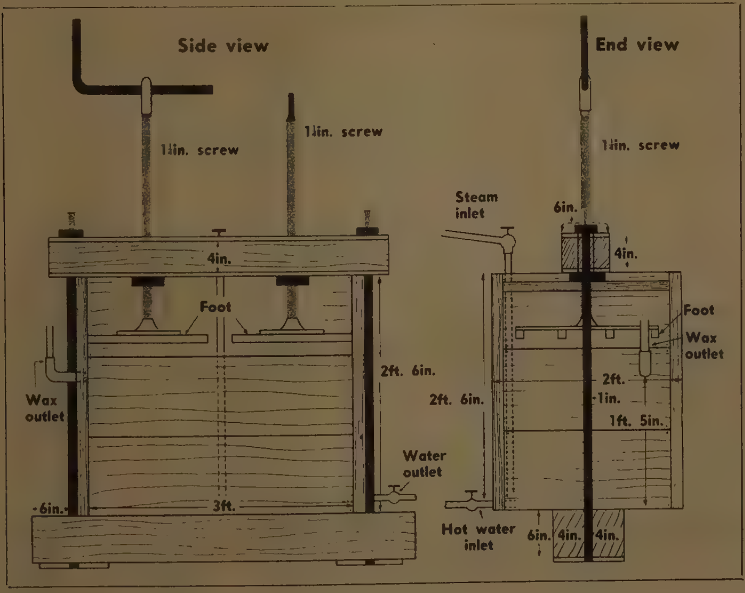
Efficient Press

To handle larger quantities and avoid the repeated task of loading and unloading the small press Mr. L. F. Robins, Temuka, designed a large press in which the contents are kept hot by a steam jet. This press recovers the greatest possible amount of wax and can be conveniently operated at any time that the steam boiler is being used for other purposes and requires attention only at odd intervals.

This press will hold four sacks of material in two layers and deliver 50lb. to 60lb. of wax from one filling of old combs.

Construction of Press

The body of the press is of ⅛in. blue steel with welded joints and is supported by an outer wooden box of 1in. timber.



The body rests on two 4in. x 6in. wooden beams placed 1in. apart and running lengthwise and projecting 6in. at both ends. An inch steel rod at each end of the press runs down between the projecting ends and is anchored beneath through a heavy metal plate that spans from the outer edges of the base beams.

These rods hold down the top beam by passing up through slots in the outer extremities.

This top cross member should be of staunch 6in. x 4in. timber with 6in. x ½in. steel plates top and bottom. (Angle iron could probably be used to advantage in strengthening this beam.)

The press screws are of 1¼in. steel with seven threads to the inch and they screw through heavy nuts welded to the under plate on the top cross member.

The foot on the bottom of each screw is a piece of ½in. steel plate 18in. x 8in. across which is welded four 15in. lengths of 1in. x 1in. steel. These feet distribute the thrust of the screws.

Two grids made of nine pieces of 1in. x 1in. wood nailed on top of four pieces of 3in. x 1in. wood are placed in the bottom of the press and two separators of spaced 1in. x 1in. wooden slats running each way are placed between the two layers of bagged material.

The followers that go beneath the feet of the press screws and on top of the bags must be very strongly constructed. These have eleven pieces of 1in. x 1in. timber nailed under three pieces of 3in. x 2in. timber which are strengthened with 1½in. angle iron screwed over the top corners.

A steam pipe is led in over the back edge down to the bottom of the press. A hot water inlet comes in at the bottom and a water outlet pipe leads away from a convenient point around the lower rim.

The wax outlet works satisfactorily 17in. from the bottom and consists of a short length of 1in. pipe screwed into a bend that is loosely screwed on to a nipple brazed into the body of the press.

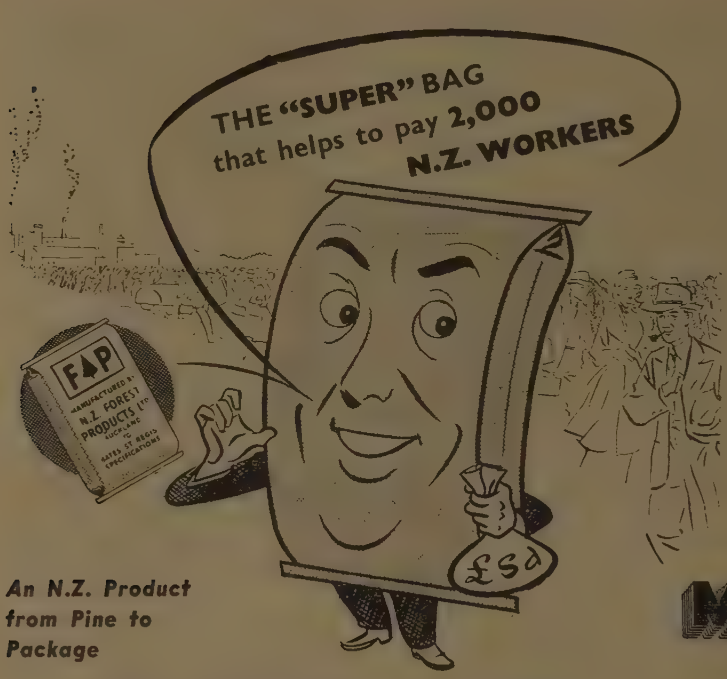
Operation of Press

The four sacks of material to be pressed are placed in the steel vat with the wooden grilles in place as illustrated. It is an advantage to have two pieces of 4in. x 1in. timber standing vertically between the two pairs of bags. The vat is about half filled with water and steam is led in to apply heat. The screws are turned down at intervals and as the cheese is compressed down the wax rises clear on the water above.

When the wax has all been squeezed out the outlet pipe is swung down to discharge the wax. Hot water can be run in through the bottom inlet if necessary to raise the level of the liquid and send the last of the wax out through the outlet.

The action of this press floats all of the wax completely clear of the dross, avoiding all clogging and sticking.

Though containing much solid material, such presses have been constructed comparatively cheaply by the use of scrap metal.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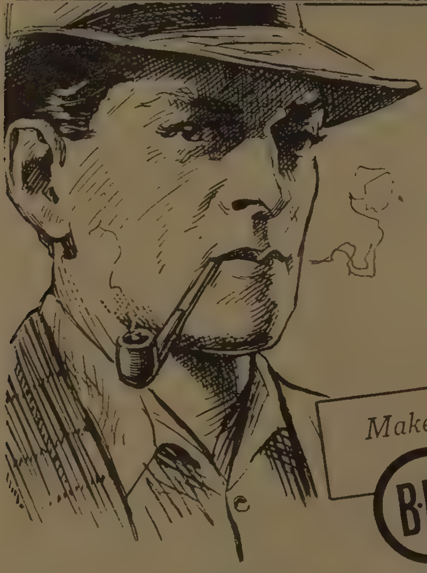

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Use of Antibiotic Supplements with Separated Milk in Pig Feeding

SINCE 1949 numerous experiments have been conducted in Europe and America to measure the response of pigs to the feeding of a growing array of antibiotic supplements. None of this research has included the use of antibiotics as supplements to a main diet of skimmed milk, which is the major pig food in New Zealand but not elsewhere. In this article D. M. Smith, Research Officer, Department of Agriculture Animal Research Station, Ruakura, discusses trials with antibiotic supplements for fattening pigs fed on separated milk.

IN general the published results of overseas trials have indicated that antibiotics may have five major effects: (1) They increase daily food intake. (2) They increase growth-rate. (3) They increase efficiency of conversion of feed to pig meat. (4) They improve the feed value of plant proteins to a stage where they can satisfactorily replace most, if not all, of the more expensive animal proteins in pig feeds. (5) They are assumed to control many unspecified types of bacterial gut infections which depress growth.

When the results of overseas research are being interpreted it is necessary to understand the conditions under which the experiments were conducted. The most important feature is that the basic feed consisted of some type of grain—maize, wheat, oats, or barley. These grains were supplemented with some protein-rich food. The second feature of importance is that the pigs were usually fed to appetite; that is, they ate from self-feeders in which meal was available to them at all times. This self-feeding of grain mixtures is common commercial practice in the U.S.A., so that such experimental techniques were in line with farming methods.

New Zealand pig feeding methods differ greatly from these. Separated milk, 90 per cent. of which is water, is the main, often the only, feed available to sows, litters, and fattening pigs. Since no country other than New Zealand uses separated milk as the major diet of pigs, no overseas experiments have been conducted on this material. For this reason a series of trials was begun at Ruakura in 1952 to see if antibiotic supplements to separated milk had any effect when fed to fattening pigs. In addition, as there was evidence from the U.S.A. that young pigs showed greater responses than older pigs, experiments were also conducted on litters suckling sows. A summary of the results of these experiments follows.

Effect on Creep-fed Pigs

1. **Effect of penicillin supplement in milk and meal fed to pigs in the creep:** This investigation was carried out over two seasons. Eight sows and litters were used in each season; four of the litters were fed antibiotics from the end of the third week to weaning at 8 weeks and the other four received no supplement.

The litters were weighed once a week and the creep food consumption was measured daily. One of the difficulties with this type of experiment is that the growth of a litter suckling the sow is the result of the sow's milk production as well as creep intake. It would be very easy to give credit to the particular type of creep feeding used for any extra gains which were the result of higher sow production. For this reason the milk production of all the sows used in this investigation was measured and its composition determined.

The combined results of the two experiments are shown in Table 1. The period covered is the last 5 weeks,

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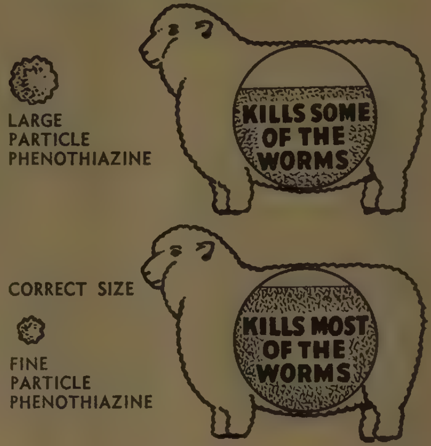
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since creep feed was available over this time.

The litters on the two treatments received approximately the same amount of milk from their mothers, but those receiving penicillin ate more feed from the creep. As a result they gained an extra 2lb. per pig over the last 5 weeks. Two features of this experiment which are not shown in the table were:—

TABLE 1

Treatment	No. of sows	No. of pigs	Feed per pig from: Sow lb.	Creep lb.	Gain per pig lb.	Weaning weight lb.
Penicillin in creep ..	8	77	18.12	19.47	27.07	37.2
No penicillin	8	78	18.74	16.03	25.1	35.7

(a) In the first season the heaviest litter and the lightest litter at weaning were in the no penicillin group and in the second season the heaviest and the lightest litters were both in the penicillin group.

(b) The total feed required to produce a pound of gain in the litters (sow's milk and creep combined) was the same for the two groups. Efficiency, therefore, was not increased as a result of penicillin feeding.

The following conclusions may be drawn:—

The addition of penicillin to a creep mixture will in most cases result in an increased feed intake by the suckling pig. This increased intake will result in slightly heavier weaning weights. This conclusion is true only where milk and meal, especially meal, are available to the litter at all times. It would be quite false if a small quantity of meal were fed twice a day in the creep as it so often is on farms.

Effect on Fattening Pigs

2. The effect of antibiotics fed to fattening pigs: One of the effects of antibiotic feeding found by overseas workers was an increase in feed conversion efficiency. Obviously an improvement in the amount of meat produced from each gallon of milk fed on New Zealand dairy farms is most desirable. The second experiment of the series at Ruakura was therefore aimed at finding the effect of antibiotics on feed economy when antibiotics were fed with separated milk. In this experiment every pig received the same feed at any given weight. Both antibiotics were added to the milk at the rate of 5 gm. per ton of dry matter. Any effect of antibiotics on appetite was therefore eliminated.

The treatments used were: (a) No antibiotic, (b) penicillin, (c) no antibiotic, and (d) aureomycin. Four lots of pigs were fed individually and two lots of pigs were fed in groups. The results are shown in Table 2.

TABLE 3

Treatment	Control	Penicillin
Weight at start (lb.)	49	50
Weight at finish (lb.)	98	100
Days on experiment ..	36	36
Gallons per lb. gain ..	2.63	2.61
Mean intake per day (gallons)	3.58	3.61

None of the differences shown in the table is statistically significant. In each experiment some of the control pigs grew better than their litter mates that received antibiotics and some did not.

TABLE 2

Treatment	Control	Penicillin	Control	Aureomycin
Weight at start (lb.) ..	40	40	40	41
Weight at finish (lb.)	100	101	101	102
Days on experiment ..	56	54	60	56
Gallons per lb. of gain	2.22	2.26	2.40	2.32
Group fed				
Gallons per lb. of gain			2.37	2.37

It was concluded, therefore, that neither penicillin nor aureomycin increased the efficiency of feed conversion of separated milk when the milk was fed in rationed amounts. However, as was stated earlier, overseas experiments with antibiotics were mainly conducted under ad lib. feeding conditions. Therefore, if antibiotics stimulated the pig to eat more, increased growth-rate, but not necessarily improved feed economy, should result.

The next experiment was therefore conducted with pigs fed in groups and having access to milk at all times. The results of this experiment are shown in Table 3.

Again there is no difference in response between the pigs receiving penicillin and those not receiving it. All the pigs in this experiment scoured badly and showed the usual signs of overfeeding associated with the practice of keeping the trough full of milk at all times.

It was concluded that under separated milk feeding conditions the use of antibiotics did not increase intake and hence growth-rate. It appeared that sheer physical holding capacity rather than appetite was the factor limiting intake. It should be realised that a pig weighing 100lb. will drink about 4½ gallons of milk per day. This represents 45 per cent. of its bodyweight. On the other hand a grain-fed pig of the same weight needs to eat only 4½ per cent. of its body-weight to obtain the same nutritive intake.

This failure of antibiotics to improve performance in either rate or efficiency of gain in the trials already described led to two further experiments. In one the possible effects of the high dilution of antibiotics resulting when normal doses were fed with separated milk was tested by using 50 gm. per ton of dry matter against the normal rate of 5 gm.

In the second experiment the suggestion that the high standard of cleanliness and management at Ruakura prevented the possibility of any beneficial effects from antibiotics through control of sub-clinical infections was tested in trials under farm conditions.

The first experiment involved five groups as follows: (a) Control, (b) penicillin at the rate of 5 gm. per ton of dry matter fed, (c) penicillin at the rate of 50 gm. per ton of dry matter, (d) streptomycin at the rate of 5 gm. per ton, and (e) streptomycin at the rate of 50 gm. per ton.

The second experiment was conducted on two farms where housing and handling conditions were typical of those found in the Waikato. On one farm penicillin was fed and on the other streptomycin, both at the standard rate of 5 gm. per ton of dry matter.

A member of the Ruakura staff visited both farms twice daily and fed the experimental animals. The pigs were weighed each week and the rations adjusted according to liveweights as in the first fattening experiment. The results of this third series of trials are shown in Table 4.

Both penicillin and streptomycin reduced feed requirements per pound of gain by approximately 6 per cent., and the time required to reach 110lb. liveweight by 6 per cent. As discussed later these differences are so small as to have little, if any, practical significance. There was no difference between the two levels of supplement. In the farm field trials the control and supplemented animals grew equally well, with no benefit from antibiotics.

Summary of Results

Results of the 10 trials can be summarised as follows:—

1. The response of litters fed antibiotics in the creep was small and expressed by increased appetite and rate of gain, which was possible only because of the ad lib. creep feeding system used.

2. The bulkiness of separated milk imposes a physical limit to the daily intake of pigs fed solely on this food, so that the addition of antibiotics cannot increase food consumption. One of the main claims for antibiotics is that they increase feed intake and therefore result in faster growth. This particular response (that is, faster growth through greater intake) is not likely to be expressed under New Zealand conditions.

3. In 6 trials of the 10 carried out with fattening pigs there was no response. In 4 trials a small gain was

TABLE 4

(a) Ruakura experiments

Treatment	Control	Penicillin 5 gm.	Penicillin 50 gm.	Streptomycin 5 gm.	Streptomycin 50 gm.
Mean weight at start (lb.) ..	50	52	51	52	51
Mean weight at finish (lb.) ..	110	110.5	111	110.8	110
Days to gain 60lb.	65	63	61	62	61
Gallons per lb gain	2.84	2.69	2.66	2.69	2.66

(b) Farm trials

	Farm 1		Farm 2	
Treatment	Control	Penicillin	Control	Streptomycin
Weight at start (lb.)	28	28	29	29
Weight at finish (lb.)	79	80	89	90
Days on experiment	63	63	68	68

measurable. This represented a saving of 4 days in the time taken, and 10 gallons in the feed needed, to bring a pig from weaning to pork weight.

An important question is whether the above results—4 cases out of 10 showing a small improvement—represent a recommendation for the use of antibiotics with separated milk in fattening pigs. It may well be asked just what 4 days earlier marketing and 10 gallons of milk saved per pig mean in practice to the New Zealand farmer.

The feeding of antibiotics does not increase the number of pigs carried at any one time. This number depends entirely on the amount of milk available from the dairy herd daily, milk which must be consumed as it is produced. If antibiotic-fed pigs can be marketed 4 days earlier, there is left available the milk which would otherwise have been used to feed them over that period. The saving, therefore, consists of a perishable product available daily for a few days. Where cereals are fed, as in Europe and America, the feed saved is still in the barn. It can be stored there until needed or sold. This situation does not apply with separated milk. Where the number of pigs kept on a New Zealand farm is such that they can readily and economically drink every gallon produced without overfeeding—and this is true of only a few farms today—the milk saved by antibiotic feeding could be used economically. Where the pigs are already being overfed the extra milk would be an embarrassment.

It is suggested, therefore, that where antibiotics produce results advantage can be taken of the beneficial effects only on farms where pig numbers are high and really efficient use is already being made of the milk produced. In other words, any beneficial effect of antibiotics is a useful adjunct to already high production efficiency, but is not a means of improving basically low-efficiency units. The experiments indicate that even where production efficiency is high there is only a 40 : 60 chance that any improvement will result.

As the antibiotics used cost approximately 2s. per pig at 1954 prices and 10 gallons of milk if used to produce extra pig meat would be worth about 3s. 6d. on an efficient farm, there is a profit from antibiotics of 1s. 6d. per pig.

Finally, antibiotics will not make pigs grow faster or more economically if slow growth and low efficiency are due to poor management, poor housing, and inherently poor stock. Similarly, no farmer would expect a positive response in his pastures from lime if phosphate was the element lacking.

On present theories the position may be interpreted as follows:—

1. The possibility of increased intake with antibiotic feeding may be ruled out. In any case research at Ruakura has shown that overfeeding of young pigs leads to chronic digestive upsets, so that methods of increasing intake of bulky milk diets should be avoided rather than encouraged.
2. The improvement of the value of proteins by antibiotics to a stage where plant proteins can replace animal proteins—an important feature of their use overseas—is of no interest in New Zealand, where separated milk, an animal protein of high biological value, is the main feedstuff.
3. The remaining possibility arises from the theory that the antibiotic acts on the bacteria of the gut, depressing harmful organisms and encouraging those of value to the host. If antibiotics are expected to produce results wherever tried in New Zealand, it must be accepted as fact that all pigs harbour harmful organisms in sufficient quantity to depress growth and affect feed conversion. This is unlikely.

It is not suggested that these experiments represent the last word on the use of antibiotics in pig feeding in New Zealand. As yet there is no factual explanation available on the way these materials operate in the gut. To date experimental work has merely measured gross effects. Until more detailed research at present in progress in England and America has yielded precise information on the mode of action of the various types of antibiotics there is no point in continuing experiments which measure end results without providing an explanation of the process involved.

In the meantime, however, the experiments described, interpreted on the basis of present knowledge, suggest that the indiscriminate use of antibiotics with separated milk is unwarranted.

Show Dates

THE following are dates and venues of A. and P. shows from February to mid-April:—

NORTH ISLAND

February

4 and 5 February—Rodney A. and P. at Warkworth.

*5 February—Rangitikei A. and P. at Taihape.

5 February—Woodville A. and P. at Woodville.

*8 and 9 February—Dannevirke District A. and P. at Dannevirke.

11 February—Dannevirke Ram Fair at Dannevirke.

11 and 12 February—Taumarunui and District A. and P. at Taumarunui.

11 and 12 February—Taranaki A. and P. at New Plymouth.

*12 February—Pahiatua A. and P. at Pahiatua.

12 February—Hukerenui A. and P. at Hukerenui.

12 February—Waitemata A. and P. at Waiwera.

12 February—Galatea A. and P. at Galatea.

16 February—Te Awamutu A., P., and H. at Te Awamutu.

18 and 19 February—Ohura A., P., H., and I. at Nihoniho.

18 and 19 February—Masterton A. and P. at Masterton.

*18 and 19 February—Franklin A. and P. at Pukekohe.

19 February—Northern Wairoa A. and P. at Mititai.

19 February—Waiapu P. and I. at Ruatoria.

19 February—Te Puke A. and P. at Te Puke.

19 February—Waiapu P. and I. at Ruatoria.

19 February—Tauranga A. and P. at Tauranga.

22 February—Otorohanga A. and P. at Otorohanga.

24 February—Matamata A. and P. at Matamata.

25 and 26 February—Wellington and Hutt Valley A. and P. at Upper Hutt.

25 and 26 February—Te Kuiti and District A. and P. at Te Kuiti.

*26 February—Putaruru District A. and P. at Putaruru.

26 February—Waimarino A., P., H., and I. at Raetihi.

26 February—Whakatane A. and P. at Whakatane.

March

2 March—Morrinsville A. and P. at Morrinsville.

[illegible] March—Albany A. and P. at Albany.

[illegible] March—Waiotira Junction A. and P. at Waiotira.

*5 March—Mangonui County A. and P. at Kaitaia.

5 March—Waikato Central A. and P. at Cambridge.

5 March—Opotiki A. and P. at Opotiki.

*12 March—Whangaroa A. and P. at Kaeo.

12 March—Hawkes Bay A. and P. at Hastings.

12 March—Kumeu District A. and H. at Kumeu.

19 March—Wellsford A. and P. at Wellsford.

SOUTH ISLAND

February

*4 and 5 February—Otago A. and P. at Dunedin.

5 February—Golden Bay A. and P. at Takaka.

19 February—Murchison A. and P. at Murchison.

19 February—Banks Peninsula A. and P. at Little River.

26 February—Kaikoura A. and P. at Kaikoura.

*26 February—Maniatoto A. and P. at Ranfurly.

March

*4 and 5 March—Buller A. and P. at Westport.

*5 March—Temuka and Geraldine A. and P. at Winchester.

5 March—Amuri A. and P. at Rotherham.

*12 March—Mt. Benger A. and P. at Roxburgh.

12 March—Cheviot A. and P. at Cheviot.

*19 March—Upper Clutha A. and P. at Wanaka.

19 March—Mayfield A. and P. at Mayfield.

26 March—Hawarden A. and P. at Hawarden.

26 March—Methven A. and P. at Methven.

April

*2 April—Oxford A. and P. at Oxford.

11 April—Mackenzie County A. and P. at Fairlie.

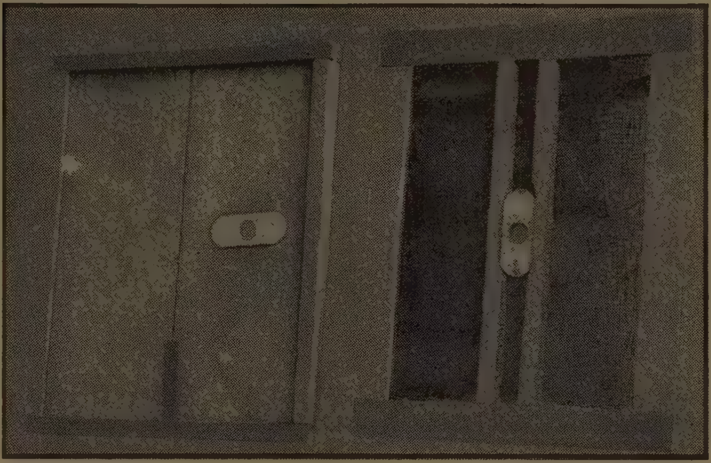
11 April—Strath-Taieri A. and P. at Middlemarch.

* The Department of Agriculture exhibit will be staged at this show.

Maintenance of Natural Quality of Honey

Seasonal Notes for the Domestic Beekeeper

MIDSUMMER, with the advent of the honey harvest, brings to the beekeeper the rewards of the care and attention expended on his colonies. Honey as stored and ripened by the bees is a pure natural sweet food containing all the aroma and flavour of the blossoms from which it was gathered. Though these qualities cannot be improved on, they can very easily be impaired by incorrect hive management and subsequent faulty handling and storage by the beekeeper. In this article D. Roberts, Apiary Instructor, Department of Agriculture, Auckland, discusses some precautions which should be observed if honey is to be maintained by the beekeeper at its natural high standard.



Two types of bee escape board.

IN all methods of handling the honey crop both on the hive and in processing and storage there are two properties inherent in honey which must be kept in mind if a first-class product is to be secured. They are the affinity of honey to water and its ability to absorb foreign flavours quickly. All honey is hygroscopic; that is, it is similar to ordinary table salt in its ability to absorb moisture from the atmosphere and surrounding sources. The tendency to absorb foreign flavours is present at all stages in the production of honey, and at no time should honey be brought into close contact with strong-smelling substances.

The most frequent cause of spoilage of honey both in the comb or when extracted is fermentation. All honeys as gathered by bees contain sugar-tolerant yeasts in varying amounts. These yeasts will normally remain inactive as long as the moisture content of the honey remains below a certain point (17.2 per cent. of moisture or a specific gravity figure of 1.420). Honey thoroughly ripened and capped over by the bees will generally have a moisture content at or below this figure, and as long as absorption of further moisture is prevented, fermentation will not readily occur. Because nectar as gathered by the bees may contain up to 70 per cent. of water, it is important that no combs of honey, whether they are to be used in the comb or in the extracted form, should be removed from the hive until the honey is fully ripened and capped over by the bees. If this rule is not closely observed, there is a danger that the honey will contain much excess moisture.

A hive with extracting combs completed and ready for storage.

When there is honey intended for human consumption on the hive care should be taken to use as little smoke as possible in hive manipulations and to avoid using smoker fuels having strong odours. Old sacking thoroughly washed and then dried in the sun makes an excellent fuel for use at any time, and a supply should always be kept on hand. Honey removed from the hive should never be stored close to anything with a marked odour such as disinfectants, soaps, kerosene, petrol, and fuel oil.

With the decline of the honey flow efforts should be made to have as many unfinished combs as possible completed. Finished combs should be removed and stored in a warm, dry place while awaiting treatment or extraction of the honey. Unfinished combs should be compacted as much as possible in the remaining honey supers on the hive, with those nearest completion being placed to the outer edges. If the honey to be removed is to be sold or used in the comb, the removal should be done as quickly as possible with the use of a minimum of smoke. Because the use of smoke as a controlling agent is effective only in that it influences the inherited instinct of the bees to protect the existence of the colony by filling their honey sacs with food in readiness to evacuate the hive, the use of too much smoke and any delay in the removal of comb honey will result in the cappings being pierced, with consequent leakage and loss of condition.

A method much to be preferred to the smoking and shaking or brushing of the bees from the combs is the use of an escape board. This is a simply constructed wooden or plywood board of the same dimensions as the honey supers. It is fitted with one or two devices known as Porter bee escapes, which allow the bees passage in one direction only.

The escape board is placed underneath the supers of honey it is desired to remove. Finding themselves shut off from the rest of the colony and the queen, the bees go down through the escapes but cannot return to the supers. In warm weather the escape board should be applied during the afternoon before the morning the supers are to be removed. In cool weather a little more time may be required, but as a general rule the escape board should not be left on the hive for more than 24 hours. The board can be placed on the hive with a minimum of disturbance by lifting the hive lid, giving one or two light puffs of smoke to the bees in the supers to be taken, replacing the lid, and then separating the supers from the rest of the hive with a hive tool and slipping the board quietly in between. The use of two escapes per board is advisable as a precaution against blockage being caused through a bee becoming caught in the spring fingers. Bee escapes can be bought for a few shillings from most suppliers of apiary equipment.

Honey for consumption in the comb should be removed from the hive immediately capping is complete if the clean, fresh, attractive appearance of the cappings is to be retained. Extreme care must be exercised in handling and all jarring or excessive vibration avoided. As the combs are all built on thin super foundation and are only newly constructed, they are very delicate and easily damaged. Particular care must be taken to avoid breaking the capping when removing sections from their holders, as damaged capping will allow honey to escape and will spoil the appearance of the combs. If the combs are to be transported in a motor vehicle, they should be well insulated against road shocks.

Combs containing brood or more than one or two cells of pollen should be set aside, and if not required by the beekeeper for his own use should be returned to the bees for winter stores. Woodwork surrounding the combs should be scraped with a knife or carpenter's scraper until it is thoroughly cleaned of wax and propolis and any discoloration is removed.

To ensure that the honey remains in good condition with the flavour unimpaired it must be stored in a warm, dry place. Comb honey keeps best at temperatures of 80 to 85 degrees F. It should be stored for only a short time where temperatures greater than 90 degrees F. or less than 70 degrees F. are liable to occur. Prolonged exposure to temperatures higher than 90 degrees F. will cause darkening of the honey and loss of flavour, and temperatures lower than 70 degrees may cause the wax cappings to contract and crack with consequent leakage. In addition, cool temperatures cause most honeys to granulate rapidly, and comb honey stored in a cool place may soon granulate in the comb and form hard crystals which render it unsuitable for table purposes. Because the cells of the combs as built by the bees have a slight inclination upward to prevent the escape of honey, combs stored in other than the natural position are much more likely to suffer leakage. Sections and frames of comb honey should always be packed or stored so that the combs rest in the same vertical position as when built by the bees.

The appeal of comb honey to the consumer is governed largely by its appearance and cleanliness. The hands should be kept thoroughly clean while comb honey is being handled, as nothing detracts so much from its appearance as smudges or fingerprints on the woodwork or wax. Wrapping and sealing the combs in transparent cellulose wrapping after they are cleaned and graded will greatly assist in maintaining condition and appearance and will prevent leakage from one comb damaging others.

Comb honey which is carefully handled, properly wrapped, and stored in dry conditions at correct temperatures will remain in first-class condition for months.

Correspondence Courses in Agriculture

CORRESPONDENCE courses in agricultural subjects are provided by two correspondence schools of the New Zealand Department of Education in Wellington for two classes of students in any part of New Zealand who cannot attend day or evening classes in their locality. These schools are the Correspondence School and the Technical Correspondence School.

THE Correspondence School provides post-primary courses in agriculture up to School Certificate standard for both full-time and part-time pupils. Applicants for courses who have had no agricultural experience or have not previously taken agricultural subjects should apply for one of the introductory courses listed as available from the Correspondence School. The Technical Correspondence School enrols part-time students for courses relating to the branch of agriculture or horticulture in which they are engaged.

Free post-primary education for 5 years or until the end of the year in which he or she reaches the age of 19 (whichever is the longer) is granted to every person in New Zealand. Applicants for correspondence courses who have not completed a 5-year period of free post-primary education are therefore entitled to receive their courses free until they have completed that period. Students who already have had 5 years' free post-primary education have to pay fees for courses at both correspondence schools, but these fees are low and text-books may be hired.

Details of the courses available from the two schools follow. Further information may be obtained from the Headmaster, Correspondence School, Clifton Terrace, Wellington, or the Principal, Technical Correspondence School, 29 Wallace Street, Wellington.

Correspondence School Courses

Farm Practice

A 1-year course dealing briefly with the more important branches of New Zealand's agriculture. This course is used as an introduction to the agricultural subjects of School Certificate, but it is also suitable for general study by pupils and adults interested in farming in New Zealand.

School Certificate Subjects

General agriculture. A 2-year course covering how a plant grows, seed certification; soils, fertilisers, and manures; crops and pastures; the main types of plant and animal life of interest to the farmer.

Animal husbandry. A 2-year course covering the cow, pig, horse, and sheep; principal breeds; current economic problems in stock farming; wool; pastures and their management; supplementary crops; genetics; physiology and diseases.

Dairying. A 2-year course covering milk, cream, butter, and cheese; their production and distribution; herd testing and improvement; care and management of cattle; use of dairy products.

Biology. A 2-year course covering the form and function of plants and animals in relation to their environments.

Horticulture. A 2-year course covering plant form, function, and growth in relation to gardening matters.

The School Certificate subjects may also be taken for general knowledge by non-examination pupils. Any number of the above courses can be studied at the same time and provision is made for both written and practical work.

Subjects for Junior Examination of National Diploma in Horticulture

Chemistry.
Bookkeeping.

Other subjects of this course may be obtained from the Technical Correspondence School.

Technical Correspondence School Courses

Agriculture

Dairy Farming

Principles of animal production.
Principles of animal nutrition.
Grasslands of New Zealand.
Dairy farming I.
Dairy farming II.

Sheep Farming

Principles of animal production.
Principles of animal nutrition.
Grasslands of New Zealand.
Wool.

Arable Farming

Crops and cropping.
Arable farming in New Zealand.

Short Courses

Farm bookkeeping.
Milk.
Concrete for the home and the farm.

Horticulture

Courses for National Diploma of Horticulture*

Junior examination: Horticultural botany; principles of plant protection.

Intermediate examination: Principles of botanical classification; principles and practice of horticulture; surveying, levelling, and drainage.

Market Gardeners' Certificate: Commercial gardening.

* Examinations conducted by the Royal New Zealand Institute of Horticulture.

Short Courses

Fruit growing.
Introduction to forestry.
Practical horticulture.

Dairy Manufactures

Courses for the Dairy Factory Managers' Registration Board Examination

Buttermaking.
Cheesemaking.
Dairy factory management.
Milk.
Steam boilers and steam engines.

Raised Meat Pies

WHEN shops are closed over holiday periods or when holidays are being spent many miles from a shopping centre it becomes difficult to provide meat for meals. In hot weather uncooked meat does not keep and cold meat is often considered unappetising, especially if it reappears on succeeding days, and the problem is to find some way of serving cold meat appetisingly. In this article Maud B. Strain, Field Officer in Rural Sociology, Department of Agriculture, Dunedin, suggests that one way of solving the difficulty is by reviving an old-time favourite, the raised meat pie.

BESIDES the occasional difficulty of obtaining fresh meat another aspect has to be considered. Many people spend holidays and weekends at a seaside bach, or perhaps camping, and they begrudge time spent in cooking meals. Something that carries well and will provide an appetising and satisfying meal with the smallest amount of preparation is wanted on these occasions. A raised meat pie is the answer. It is also satisfactory for a picnic lunch or for the evening meal on Sunday. Eaten with crisp lettuce leaves, tomatoes, or cucumber it will be doubly good.

Special Pastry

The particular type of pastry used for these pies keeps well for days without becoming soft and flabby and is firm enough to retain its shape and stand careful packing without breaking up. This is an added advantage, because it means that after the pie is made there is no need for a container or pie dish to occupy space. Pie dishes are unyielding and incompressible and are awkward to accommodate on a camping tour.

This special pastry, hot water pastry, is quite different from the pastry which usually covers a meat or fruit pie. When short, flaky, and puff pastry are being made everything must be kept as cold as possible, and the less handling the pastry receives the better; with this pastry hot water or hot milk is used and the pastry must be kept warm and requires a certain amount of kneading. If it is allowed to cool down, it becomes almost impossible to work with.

Suitable Meats

Pork, game, chicken, and veal and ham are the meats most commonly chosen for these pies, a well-known example being the traditional Melton Mowbray pork pies.

These pies are always eaten cold. This means that any liquid in the pie must be in jelly form when the pie is served; for this reason the type of meat that gives a gravy that will set when cold is preferred. With veal and ham or with chicken there is sufficient gelatine in the meat to make a firm jelly, but with some other meats it is necessary to add a small quantity of gelatine dissolved in a little stock or water, or alternatively some stock made from veal bones, after the pie is cooked. Veal by itself is somewhat tasteless and is usually accompanied by a small amount of ham to add to the flavour. Hard-boiled eggs and forcemeat balls are frequently added to give an attractive appearance to the pie when it is cut and to add to its tastiness.

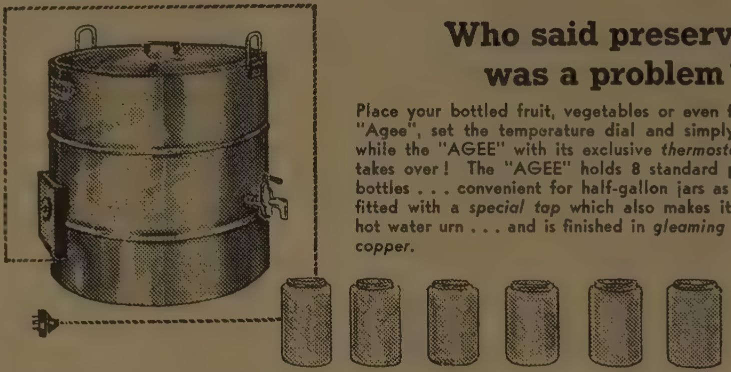
Where it is not possible to keep an even oven heat, as sometimes happens with a coal range, it is an advantage to pre-cook the meat to obviate the difficulty of having the pastry cooked before the meat is ready. To do this the meat should be cut into cubes, seasoned, and put in a saucepan or casserole with sufficient water barely to cover it, and cooked very gently until it is tender. Any bones in the meat should be cooked with the meat, because the gelatine from them helps the liquid to set when cold.

Fillings

The filling is arranged in the prepared pie shells in layers, first meat, then small forcemeat balls, if these are being used, then hard-boiled eggs cut lengthwise in halves, and then the rest of the meat and forcemeat balls. Sufficient of the liquid in which the meat was cooked is added so that it can be seen among the top layer but does not cover it. The cover is then put on the pie. A round hole is cut in the cover to allow steam to escape and to allow more liquid to be added when the pie is taken from the oven. The edges are damped, pinched together well, and crimped or otherwise decorated. Pastry leaves are arranged for ornamentation on top and the pie is baked in a moderate oven at 375 degrees F. for 1¼ to 1½ hours or until the pastry becomes golden brown.

When the pie appears to be almost cooked it may be brushed over with well-beaten egg and returned to the oven to finish cooking; this gives a glazed appearance.

If a fowl is being used for chicken pie, it is better to cook the fowl beforehand. A tablespoon of fat is melted in a casserole or a saucepan with a tightly fitting lid, the fowl is put in, and a cup of water is added. The fowl is cooked gently until the flesh can be separated from the bones. The fat is removed from the liquid in which the fowl has been cooked and this liquid is added to the pie after the meat, forcemeat, and hard-boiled eggs have been arranged as described above. The liquid forms a firm, well-flavoured jelly when the pie



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is cold. If the meat has not been pre-cooked, it is usually necessary to add a little more liquid when the pie is taken from the oven. The meat shrinks in cooking and the liquid is added to fill up the spaces formed by this shrinkage.

To Make the Pastry

4oz. of fat (1oz. of butter, 3oz. of lard)
1lb. of flour
1 teaspoon of salt
½ pint of hot milk or milk and water

Put the fat and water, or milk, into a saucepan and bring it to boiling point.

Sieve the flour and salt into a mixing bowl, make a well in the centre, and as soon as the water has come to the boil and all the fat has melted pour the hot liquid into the well in the flour and mix it with a wooden spoon.

Lift the mixture on to a floured board and knead it with the hands until all the cracks have disappeared and the pastry is smooth and pliable.

Cut off about a quarter of the pastry for the cover and decorations. This should be wrapped in greaseproof paper and kept warm on a plate over a saucepan of boiling water.

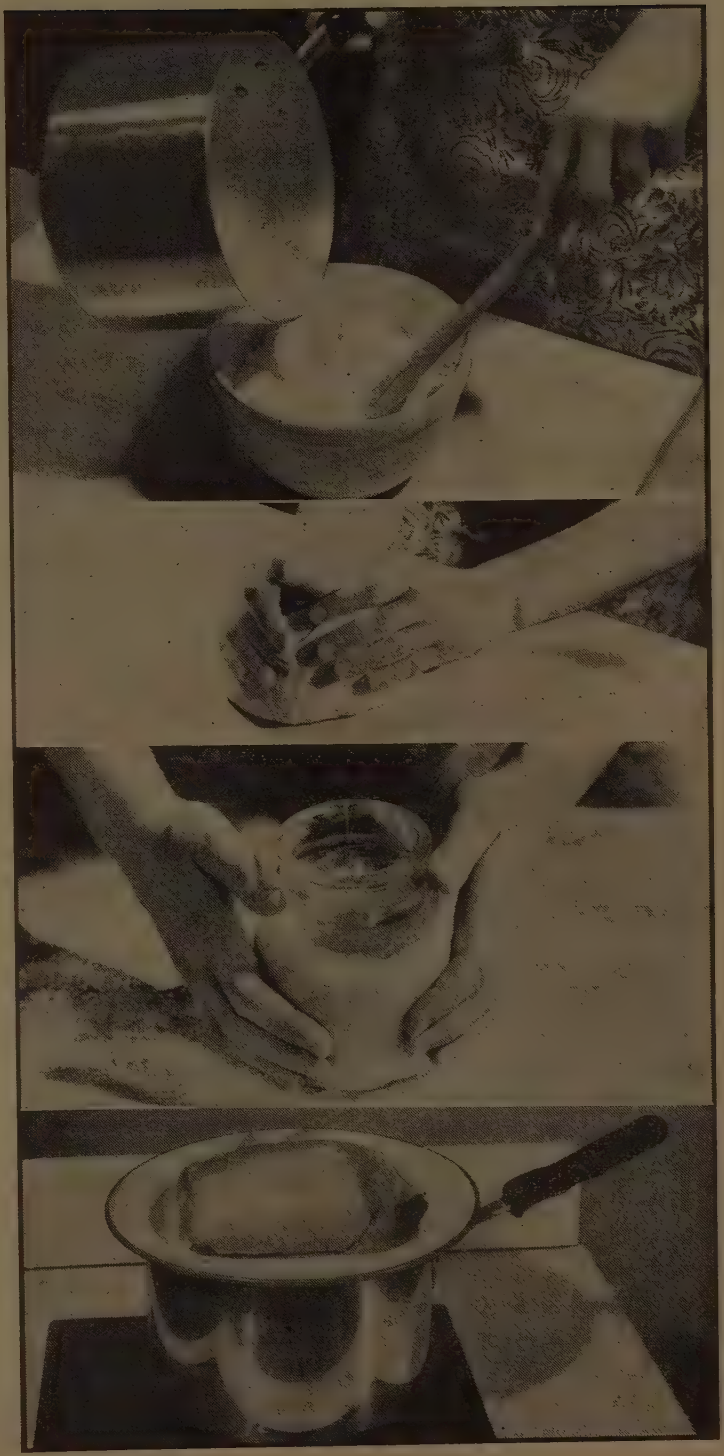
Roll out the rest of the pastry about ⅓in. thick and mould it to form a lining to a greased pie mould or cake tin. Put in the filling.

Roll out the crust to form the lid. Moisten the edge with cold water, put the lid in position, and press the edges of the lid and the side of the pie well together. Trim them neatly, leaving a ridge about ¼in. high standing up round the pie. Flute or decorate this edge as desired.

Cut a hole in the centre of the top of the pie, arrange pastry leaves round it, and brush the pie over with beaten egg to form a glaze.

Bake in a moderate oven at about 375 degrees F. until the pastry becomes golden brown and the meat feels tender when tested with a skewer. If the meat has been pre-cooked, cooking will take 1¼ to 1½ hours. For uncooked meat the time will be 2 to 2½ hours. When the pie is removed from the oven place a funnel in the hole in the top of the pie and fill the pie with stock that will set when cold. If the pastry is browning before the meat is cooked, greased paper may be put over the top of the pie.

Pies may be cooked without a tin. The pastry is moulded in a cake tin and left to cool down and become firm.



Illustrations at right: Top—The boiling water and lard mixture is poured into a well in the centre of the flour and salt in the mixing bowl. Upper middle—The pastry is kneaded quickly, so that it does not have time to cool, until it is smooth and pliable. Lower middle—A portion of the pastry is cut off, a pie mould or jam jar is pressed down in the centre of this portion, and the pastry is worked up round the sides to the desired height. Bottom—The portion of the pastry reserved for the top of the pie is kept warm by being rolled in greaseproof paper and placed on a plate on top of a saucepan of hot water until it is needed.

It can then be removed from the mould, filled, and the lid put on. A double thickness of greaseproof paper is placed round the sides and tied on with white thread.

Small pies can be moulded round a flat-bottomed jam jar. The pastry is raised 2in. to 2½in. up the outside of the jar, allowed to set, and the jar removed. Small pies are filled and covered in the same way as the bigger ones.

Various Pies

Veal and Ham Pie

2½lb. of fillet of veal
½lb. of lean ham
1 teaspoon of salt
½ teaspoon of pepper
Shake of nutmeg
2 eggs (hard boiled)
Forcemeat balls
Stock
Hot water pastry

Cut the veal and ham into small cubes and season with salt, pepper, and nutmeg. Put bones on to boil to make stock. Make some small forcemeat balls from 3oz. of breadcrumbs, 1oz. of finely chopped suet, 1oz. of lean ham, ½ teaspoon of mixed herbs, 1 teaspoon of chopped parsley, ½ teaspoon of salt, and a few shakes of cayenne pepper mixed together with beaten egg. Put some veal in the bottom of the pie, then some ham and forcemeat balls, and then hard-boiled eggs cut in halves lengthwise and arranged to look attractive when the pie is cut. Add more veal, ham, and forcemeat balls in layers until the pie is filled. Add a very little stock and cover with the remaining pastry, ornament the top, and make a hole in the centre. Bake at 375 degrees F. for 2 to 2½ hours. When cooked add more stock through the hole in the centre top.

Pork Pie

2½lb. of lean pork
1 teaspoon of salt
¼ teaspoon of pepper
Beaten egg
1 teaspoon of finely chopped sage
Pinch of cayenne pepper

Pastry

1lb. of flour
¼lb. of fat (1oz. of butter, 3oz. of lard)
Pinch of salt
½ pint of boiling water

Make a pastry pie shell as described previously. Put a layer of pork cut into small cubes on the bottom of the mould and sprinkle with salt, pepper, and sage. Continue in this way until the mould is full. Add a small amount of water or stock (about 1 tablespoon), cover with the remaining pastry, make a hole in the top, ornament the pie with pastry leaves, and crimp the edges. Brush over the top with beaten egg and bake in a slow oven at about 375 degrees F. If this quantity is made into one pie, it will take 2½ hours to cook; if into two pies, 1½ hours should be sufficient. When the pie is almost cold a little stock made from the pork bones should be poured in through the hole in the top.

Chicken Pie

1 boiling fowl
1lb. of fillet of veal
3 hard-boiled eggs
¼lb. of mushrooms (can be omitted)
1oz. of butter
4oz. of bacon
Chopped parsley
Stock

Cut the fowl into joints and the veal into cubes and put these into a casserole with a pinch of ground mace, a teaspoon of salt, pepper to taste, and about ½ pint of water. Cook gently until the meat is tender and will come easily off the bones. (If a casserole is not available, the fowl may be steamed by putting the joints and other ingredients into a basin, covering the basin with greased paper, standing it in a saucepan of boiling water with the water coming about two-thirds up the sides of the basin, and steaming until the meat is tender.)

Chop the mushrooms and fry them slowly in the butter. Chop the parsley and the bacon.

Put a layer of veal and chicken at the bottom of the mould, sprinkle half the mushrooms over these, then a layer of sliced hard-boiled eggs, and then a layer of chopped bacon and parsley. Continue in this way until all the ingredients are in the pie dish. Moisten with 2 tablespoons of stock. Wet the edge of the pastry mould and roll out the pastry cover and put it in place on the pie, pinching the edges together well. Brush over with beaten egg and make a hole in the centre. Decorate with pastry leaves and brush these over also with beaten egg. Bake in a moderate oven (375 degrees F.) for 1 to 1¼ hours.

More stock can be poured through the hole in the top of the pie after it is cooked and almost cold. Too much liquid put in before cooking may boil up and saturate the underside of the pastry crust or even boil out of the pie.

Game Pie

About 3lb. of any game available
¼lb. of lean ham
1 onion
Salt and pepper
Pinch of mace
Forcemeat balls
¼lb. of mushrooms (optional)
½ teaspoon of grated lemon rind
1 teaspoon of flour
Beaten egg

Make the hot water pastry for a raised pie shell.

Cut the game into neat joints, put it in a casserole with the ham (cut into cubes), onion (finely chopped), mace, lemon rind, pepper and salt to taste, and enough stock (made from the giblets) to cover. Simmer very slowly until the birds are tender, remove the bones, and add the flour mixed with a little cold stock and simmer for a further 10 minutes. If mushrooms are used, wash and peel these and fry them in a little butter. The recipe for forcemeat balls is given in the recipe for veal and ham pie. Put layers of meat, forcemeat, and mushrooms alternately until the pie is full, adding a very small amount of gravy if necessary. Cover with pastry, decorate, glaze, and bake in a moderate oven as described in the preceding recipe.

Heading photograph by Campbell.

Testing Shrinkage in Fabrics

SHRINKAGE of garments, loose covers, curtains, and bedspreads after washing is a problem most housewives have encountered. Yet many begrudge the time involved in wetting and ironing a fabric which might after all shrink very little, if at all. It is an operation which also sometimes detracts from the new appearance of the article when it is first made up. A very quick way of testing shrinkage is to cut a strip off the selvedge 4in. long and 2in. to 4in. wide, lay it flat and draw around it, wash it and quickly iron it dry, and see if it still fits the drawing.

A piece of furnishing linen that has been washed and ironed being tested for shrinkage against its original size.

This may be a wise precaution whatever the fabric, and it is especially important to test for shrinkage when two different types of cloth which may shrink in different degree are being used in the same garment.

—*EVELYN E. MOORE, Field Officer in Rural Sociology,*
Department of Agriculture, Palmerston North

Shrubs for Summer Colour in the Flower Garden

SHRUBS which flower during summer vary widely in the range of conditions they require. Some of them are hardy and will grow throughout the country, some prefer coastal conditions, and others, to be really satisfactory, need the warm, almost sub-tropical conditions of Auckland and further north. This article by M. Joanna Lockie, Horticultural Instructor, Department of Agriculture, Auckland, lists and describes various summer flowering trees and shrubs.

DURING summer any plant which will grow on untended or relatively so and will produce a crop of flowers at this time is a boon, especially as watering becomes a burden and often water restrictions or shortage of water are limiting factors. The ability of many shrubs and trees, once established, to flower during summer withan assortment of substances broadly an advantage over comparatively shallow rooting annuals.

Flower colours can be cool and refreshing; for example, large banks of blue and pink hydrangeas are pleasant to look at on the cool side of the house. The reds and strong colours can be equally pleasing because they are flamboyant and striking in keeping with strong sunlight and bright skies.

Even shrubs whose main flowering season is not during summer can be useful at this time. Their green foliage is refreshing to look at, and large glossy leaves or luscious growth give the illusion of coolness. Shade from trees and large shrubs makes an appreciable difference to temperature, especially where shade is allowed to fall over any paved or concreted areas which can and do build up heat which makes them unbearable on hot days. Shade and green foliage can also counteract the glare given off nearby buildings or walls, and leafy surfaces act as a filter to sift the dust from the air. This is especially important in country areas, where from unsealed roads clouds of dust are sent whirling as lorries and other traffic pass.

Selection of Shrubs and Trees

In northern districts not subject to extremes of temperature during summer and winter and where the rainfall is fairly evenly spread over the year it is possible to grow quite a different range of plant material from that grown in southern districts where there are definite wet and dry seasons, and colder winter temperatures. Nevertheless, some plant material which does well in southern districts, notably autumn foliage plants and some berried shrubs, may grow in the north, but not give the display they do in districts which suit them better. Among the latter are forsythia, lilac, and japonica, which put on a wonderful spring display with a mass of bloom in the south, but are never quite so good in the north, where usually flowers and leaves come together and flowers are produced sporadically over a longer period.

To get the best results from flowering shrubs, therefore, it is necessary to grow those which suit the locality and do well under local climatic conditions.

Shrubs and Trees for General Use

The shrubs described in this section can be grown practically anywhere throughout the country. Clear orange is a good summer colour and can be had with flowers of *Beaufortia sparsa*, which contrast most effectively with its light green feathery foliage. This Australian shrub is similar in flower and growth habit to a bottle brush, though it is much finer and not as stiff. It makes a showy bush 8ft. high which can be seen from a distance and does well in average garden soil in a dry position. It tends to become leggy, so that pruning from the time of planting is necessary, and a new bush should be cut back to about half its height to make it branch out. Subsequently pruning is necessary every year after flowering. Only new growth should be shortened, because older wood seldom produces new growth even when cut back severely.

Another orange flowered shrub, though of totally different appearance, is *Punica nana*, a dwarf or ornamental

HEADING PHOTOGRAPHS: Dust in swirling clouds from passing traffic is very trying to the home owner, and a screen of trees does much to intercept it. At right the tree is Indian bean tree (*Catalpa bignonioides*), which has a most attractive habit of growth and produces large bunches of white flowers.

pomegranate. This shrub grows to a height of 2ft. and forms a compact bush, with neat, glossy, deciduous foliage. Sometimes the leaves have a yellow tinge. The flowers are bold, having a thick, fleshy, orange calyx enclosing darker orange petals, which appear like crushed silk. The dwarf pomegranate will stand hard, dry conditions and is useful in the front of a border or on a dry bank. It appears to be perfectly satisfactory if left unpruned.

Another low growing plant useful for a hard, dry situation or a bank is *Hypericum patulum grandiflorum.* This shrub forms a neat bush 2ft. to 3ft. in height, with spreading branches and bronze tinted leaves. The wide-open cup-shaped yellow flowers are freely produced and last a long time on the bush. *H. moserianum tricolor* carries similar though much smaller flowers, but its foliage is more distinctive, being creamy with pink marking. Its growth habit differs also, being more scrambling than bushy.

Pruning of these hypericums consists of cutting out really old branches and keeping all new vigorous growth.

Indigofera incarnata (*Indigofera decora*) is also useful for hard, dry places or rocky banks. It forms a neat bush of 2ft. to 3ft. and carries a plentiful crop of small, pink flowers which are carried in racemes like a miniature wisteria. As the flowers hang to the ground, they show to better advantage on a bank or raised garden where they can be looked up at.

Indigofera is rather slow growing, and is not always easy to transplant, but once established settles down and flowers freely. Little or no pruning is needed, and it can be increased from half-ripe cuttings.

Blue is always a garden favourite, and at least five blue flowered shrubs can be had for summer. Plumbago (*Plumbago capensis*) is probably the best known, the others being *Ceratostigma willmottianum, Oxypetalum caeruleum, Perovskia atriplicifolia* and *Caryopteris incana.* Possibly because these plants are not in everyday use, though they all deserve to be, they appear to have no common names. But this should not daunt any keen gardener wishing to grow them.

Plumbago capensis grows to a height of 5ft. and can be trained even higher and is covered with clustered heads of delicate blue. It is semi-climbing and can be grown against a house wall or fence, or it can be grown as a shrub. It is frost tender, but where frosts are severe it can be grown as if it were a herbaceous perennial; the frost-blackened top growth may be cut away when the young growth shoots up in spring. A warm sheltered position is the most satisfactory. Old plants have a long flowering season and bloom prolifically, but it takes a few years for them to settle; young plants are not so generous. Plumbago is readily increased by division.

Ceratostigma willmottianum has an almost harshly bright blue flower. The flowers are similar in shape to those of the plumbago, but the bush grows only about 3ft. high, is more resistant to frost, and has distinctly bronze coloured foliage. *C. griffithi* is similar to *C. willmottianum* except that its habit of growth is more spreading, and it forms quite a mat, which makes it useful for ground cover on a bank or among shrubs. It can be trained up a wall or fence. Ceratostigmas can be left unpruned to grow as shrubs or they can be cut down after flowering and the young growth will shoot up again from the base.

Oxypetalum caeruleum (*tweedia*) carries clusters of pale blue star-shaped flowers above soft grey foliage. It grows to form a very fine delicate plant but, though the individual plants are lovely, they need grouping together to be really effective. After the plant has flowered large brown pods form, which open to expose the brown seeds attached to white silken threads. The pods opening and shedding their seeds are unusual and attractive in themselves. Tweedia grows about 18in. to 2ft. high and should be staked. Seeds germinate readily and young plants transplant and establish easily. A warm sunny position in average garden soil is all that is required.

Perovskia atriplicifolia has rather a sparse growth habit and narrow grey leaves, but its soft blue flowers are dainty and carried in spikes like a salvia. It grows to a height of 3ft., is semi-herbaceous in habit, and will grow in light soil and withstand drought. Flower heads should be shortened back after flowering.

Caryopteris incana (*Caryopteris mastacanthus*) is sometimes known as blue spirea. It requires a well-drained sunny situation and does not stand up to frost, though it does shoot up again after the branches are frosted to ground level and will flower the next season. It grows to a height of 4ft. to 5ft. and carries spikes of blue flowers. Pruning, which consists of cutting out weak wood, should be carried out in early spring, just before the new growth breaks. Propagation is by cuttings of half-ripe wood taken in summer.

The Californian tree poppy (*Romneya coulteri*) grows to a large bush of 4ft. in diameter and about 6ft. in height. Its appearance is more herbaceous than shrubby, as it has many stems arising from the ground and large silver-green foliage. The flowers, as the name suggests, look like wide-open poppies and are 5in.

Left—Spikes of flower of *Caryopteris incana*, the blue spirea. Centre—The stamen-filled yellow flowers of hypericum resemble fluffy yellow balls. Right—Clear orange flowers of *Beaufortia sparsa* stand out well from a distance.

Large white-petalled flowers of *Romneya coulteri*, Californian tree poppy.

in diameter. The white petals and large tuft of golden stamens look showy and delicate. *R. trichocalyx* is very similar, but is smaller, growing to a height of only 4ft.

Romneyas can be increased by transplanting suckers, but they are not always easy to establish.

Swainsona galegifolia is a light shrub growing to a height of 4ft. which can be treated as a perennial. It is an excellent subject for filling in dry borders or banks, though it needs a sheltered position, as it may be cut by frost. For really effective display it needs to be used in groups of six or more. Flowers are produced freely for 3 months or longer and after flowering the old stems can be cut down, the new growth breaking away again in spring. The flowers are pea shaped, with a white spot in the throat, and range in colour through whites and pinks to purplish pink. The seed pods are swan shaped and the foliage is similar to that of kowhai. Swainsona can be raised from seed, better results being obtained when seed is soaked in hot water before sowing.

Trees for General Use

Trees are even more necessary during summer than at any other times of the year. Their bulk and density give depth to the landscape at a time when the bright light and intense colours of summer sky, dry lawns, and burnt pasture combine to have a levelling and flattening effect on the scenery.

The vivid red flowers of pohutukawa (*Metrosideros excelsa* syn. *M. tomentosa*) are a well-known sight on many North Island beaches at Christmas time. The vivid flower colour and bold characteristic shape of the trees give distinction to the seascape, and any coastal gardens, with room for a pohutukawa to grow, will be assured of shade in summer.

There is a wide variation in flower colour and in time of flowering. Mature trees grow up to 70ft. in height, but take many years to reach that height. Pohutukawas are most useful for erosion control and to stop slipping on cliffs and banks and they will stand heavy cutting back if it is necessary. They are not suitable for planting very far inland.

Pohutukawas may be raised from seed, the important thing being to sow the seed as soon as it is ripe, as the seed itself lasts only about 6 weeks.

Another red flowered tree which could be used far more is the flame tree, *Brachychiton acerifolium* (*Sterculia acerifolia*). It is an Australian tree which can easily be raised by seed. During its first 2 or 3 years it makes a most ornamental pot plant for those who have a position for greenery inside. The leaves are glossy green and deeply lobed and remain on the tree except while it is in flower. The leaves are most effective in themselves, but just as flowering commences they are shed, and the tree becomes covered with small red helmet-shaped flowers. Sometimes the tree flowers only on one side, but it certainly makes a vivid display.

Its hard, dark brown seed pods are rather like grossly mis-shapen broad bean pods and look most unusual hanging from the tree.

The flame tree grows quite rapidly to a height of 20ft., will retain a good shape for many years, and with real old age may reach 40ft. It is one of Australia's most drought resistant trees and would be useful in areas subject to summer drought.

Another Australian tree which can be grown in a wide range of soil types and will stand up to drought conditions is the silky oak, *Grevillea robusta*. It grows rapidly to form a tall more columnar than spreading tree of 20ft. to 50ft. Its leaves are firm and finely cut and attractive. Young trees are often used as pot plants.

When the silky oak flowers in January practically every branch is covered with a mass of bright orange-gold flowers. It sheds some of its leaves before flowering, but the display it creates is magnificent. One tree in a commanding position can be seen for miles around. However, really good displays appear only in the hot, dry districts; it seems as though the harder the drought the better the flower production. The silky oak can be used in coastal plantings, but it may be hard to establish in very dry ground. Once established it grows on well.

Another tree for coastal conditions and one which is drought resistant is *Lagunaria patersoni*, known as Norfolk Island hibiscus. It grows well in coastal and exposed positions and makes an excellent line of shelter for an exposed garden.

It has a good natural pyramidal shape and grows fairly quickly to a height of 20ft. It is evergreen and attractive throughout the year with its whitish grey foliage. The pink flowers are not very large, but are quite freely produced.

Koelreuteria paniculata grows well in dry districts and is usually grown for its autumn colour. During summer its heads of yellow flowers are quite showy and its dense umbrella of green foliage is cool and shady.

Catalpa bignonioides (Indian bean tree) makes an excellent shade tree as it develops a wide branching habit, or can be used in a mixed shelter planting. It is deciduous, but carries large green leaves during summer, and its small white flowers are held in large bunches which show up well against the leaves. The catalpa flowers prolifically while quite young and grows rapidly to a height of 18ft. It does well in average garden conditions and will stand up to drought; it will also do well in cool districts.

Eucalyptus ficifolia (the scarlet gum) makes a vivid splash of colour during summer. Its brightness emphasises the mood of summer, and planted by a road gate or white painted fence, it gives an arresting effect. The scarlet gum is frost tender while young and needs protection and care until it is established. It takes about 7 years before flowering commences, but the display is well worth waiting for. As the tree ages it develops a characteristic shape, with strong rough barked brown stems and tough dark leaves. Scarlet gum seed germinates readily, but seedlings are very susceptible to damping off fungi. Also they are a little difficult to transplant and should be grown in pots, so that roots are disturbed as little as possible by the move.

Hibiscus syriacus (Rose of Sharon) is a hibiscus which can be grown in districts subject to frost. It is not as colourful as the frost tender hibiscus, *Rosa-sinensis* species, but makes a useful display where the others will not grow. The flowers are white, mauve, or pink, single or double, and often with a dark maroon blotch in the throat. These hibiscus form dense shrubs of about 8ft. with small dark green deciduous foliage. Because they flower profusely, these shrubs should be pruned every year in early spring just before leaf growth commences. All weak and spindly growth and as much hard old wood as possible should be cut out, leaving all the healthy vigorous material. If hibiscus are left unpruned, they quickly run out, and the flower display lessens noticeably. Where a plant becomes exhausted it should be replaced with a new one.

Shrubs for Northern Districts

The shrubs given in this section, to give any satisfaction at all, should be grown only in warmer districts, where

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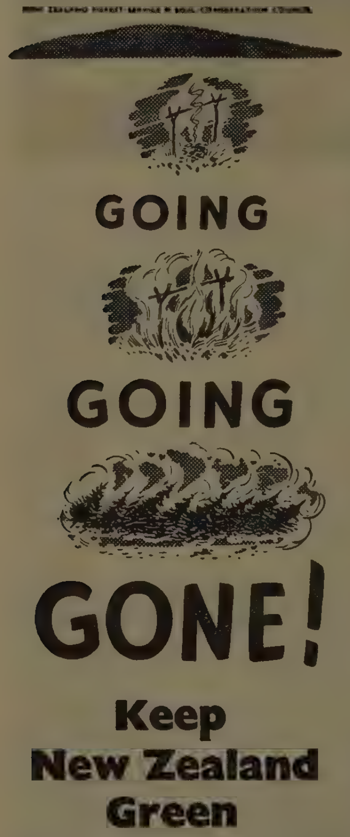

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Left the blue flowers of *Clerodendron ugandense* stand away from and show up clearly against the rest of the bush. Centre—Having white, lavender, and blue flowers all out at once ***Brunfelsia latifolia*** is an interesting shrub. Right—The pink flowers of ***Jacobinia carnea*** last well and make a bold display.

frosts are not severe enough to harm them seriously.

Brunfelsia latifolia is an attractive shrub, sometimes called "yesterday, today, and tomorrow" because of its flowers, which are white, lavender, and blue and all out on the bush at the same time. The flowers are wide open and scented and show to advantage against the glossy green foliage. The shrub has a neat columnar habit of growth and reaches a height of 4ft. to 6ft. In a suitable district it flourishes under ordinary garden conditions.

Blue butterfly bush is a most apt name for *Clerodendron ugandense*. The flowers are held on the branches as though they are butterflies. Even in warm districts it requires a sheltered situation and protection from frost, but grown under ideal conditions it is an outstanding success, for its light blue flowers will always arouse interest. It makes quite a dense bush and will reach a height of 4ft. to 8ft.

Poinciana gilliesi (*Caesalpinia gilliesi*) carries showy flowers with large, delicate yellow petals and long, strong red stamens. It forms a straggly bush of up to 6ft. with sparse acacia-like foliage, but where it can be grown in a dry position its flower display is well worth while.

Euphorbia splendens (crown-of-thorns) is a native of Madagascar which flowers throughout most of the year. It can be trained as a shrub, where it grows to about 4ft. and covers quite an area, or it can be trained as a climber against a wall or fence. It can be grown in average garden conditions in districts which suit it.

The stems are about 1in. in diameter, brown, and very thorny, and grow in a tangled mass. The whole bush is attractive and provides a good contrast for the many clusters of small, vivid red bracted flowers.

The only pruning necessary is to restrict its growth or train it.

Erythrina crista-galli (coral tree) is only partly hardy, but it will grow in most districts, provided it has a warm, well-sheltered position in cooler districts. It will stand hard conditions and drought, but does better under more favourable conditions.

The large pea-shaped dark red flowers hang along the branches of the current season's wood. Flowering branches die back each year and after flowers have finished the flowering stems should be pruned off to make room for next year's shoots.

Jacobinia carnea (*Justicia carnea*) is frost tender, but grows well in a corner under the eaves or sheltered by a fence. Foliage is distinct, being glossy green above and with red veins and red fur beneath. It develops tall, rigid stems which run up 4ft. to 6ft. and carry long, dense terminal heads of pink flowers. A large group of these plants looks striking. Though cut by frost, jacobinia usually grows again the following spring.

Rondeletia amoena carries clusters of soft pink scented flowers and grows to a height of 4ft. It is frost tender, but in warm districts as long as it is sheltered it does well.

Trees for Northern Districts

The trees given for northern districts can be grown in certain areas in cooler districts, but it takes a lot of attention and work to establish them; a heavy frost, even after they are established, can cause serious damage.

The blue flowers of the jacaranda, *Jacaranda acutifolia* (*J. ovalifolia*), are a sight to look forward to. It grows to a height of 15ft. to 20ft., with light feathery foliage, and can be grown as a specimen tree in a sheltered garden, where it forms a well branched head, or it can be grown among other trees, where it will receive shelter, but loses its good shape. Where the climate is not suitable for jacarandas *Paulownia tomentosa* (*P. imperialis*) may be grown. It also is deciduous and carries large clusters of blue flowers. But its foliage is large and dense and it will stand up to severe weather. Young foliage on young trees may be burnt by frost, but once a tree is established it becomes more resistant.

Datura suaveolens (*Brugmansia*), angels trumpet, grows on one slight trunk and carries an evenly balanced head of large green foliage. From the foliage long white flowers appear to be suspended, giving rise to its name of angels trumpet. The flowers are heavily perfumed. This datura grows easily on any soil and flowers prolifically throughout summer. It can be grown readily from cuttings, but it must have a sheltered position and a warm climate to be really satisfactory.

Clerodendron trichotomum is a deciduous tree of 10ft. to 15ft. which is uncommon, but deserves to be used more in districts where it will grow. It forms a small, neat tree with a clearly defined trunk and round head. The flowers in summer are white, backed by fleshy red calyx petals. As the flowers fade black berries develop which contrast well with the red calyx, and the whole cluster of red and black remains on the tree until the end of March. In flower or in berry it makes a most effective tree. Average garden conditions suit this tree as long as the climate is favourable.

Lagerstroemia indica (crepe myrtle) is a small deciduous tree of 10ft. which should be pruned just before spring growth breaks. The flowers are bright pink and most unusual because they resemble frilled material more than petals. This is another tree which is worthy of greater attention.

Garden Work for February

Staking and tying of perennials should be kept up to date and continued removal of spent flowers will help to keep the garden bright. Spent flowers on geraniums and hydrangeas look particularly drab if left untended, whereas by removing them a further crop of flowers is encouraged.

Seed of perennials, hollyhock, aquilegia, sweet william, pansy, and

Lilium speciosum is not difficult to grow and looks well in bold clumps.

myosotis, may be sown. Seedlings from earlier sowings can be lifted from the beds or boxes and lined out to grow on before their final planting out in spring. Seed of winter flowering sweet peas may be sown, and poppies and stock planted now will give winter flowers in the warmer districts.

Carnation cuttings may be taken or if preferred stems may be pegged down and layered. Cuttings and layers should be taken only from healthy vigorous plants to ensure good growth from the new plants.

Corms of early gladioli plantings may be lifted as soon as the foliage turns yellow and dries off.

Ixia, freesia, lachenalia and bulbous iris, grape hyacinth, and scilla may all be planted out now. For garden display group planting of small bulbs can be most effective. Where fruit trees or blossom trees are set in a lawn drifts of freesia or grape hyacinth look most attractive planted under them around the bases of their trunks.

Roses

Climbing roses should have all long new growth tied into place to prevent the brittle new wood snapping during windy weather. It will be needed for next year's flowering wood.

Summer pruning of roses, which amounts to removing weak unproductive wood, should be carried out now to encourage free blooming during autumn. All blind shoots should be cut back to a healthy bud and any spent flowers or stems remaining after flowers have been removed should also be cut back to a healthy bud. After this pruning the border can be top-dressed with compost and blood and bone at 4oz. per square yard. Lawn clippings when available may be used to add to the mulch.

Seed Saving

Seeds of any particularly good annuals can be saved. Seed should be gathered when mature, but before the capsules open and seed is scattered. Seeds collected too soon are immature and cannot be expected to give a very good germination.

Weeds

Weeds continue to grow even in the driest spells, and from now on many of them set seed. It is especially important to reduce the weed population at this time and thereby save broadcasting of the seeds in the garden.

Budding

A few successes with budding are enough to inspire gardeners to further ventures in this method of propagation. The usual budding carried out is with roses when the variety required is put on to a root stock, usually *Rosa multiflora*, which is thornless and easy to work. Cuttings of rose stock planted in June are ready for budding as soon as the bark lifts in January or February.

The bark should lift cleanly on the stock before budding is attempted; stock bushes near shrubs or trees may not be ready for budding at the same time as others in a more open situation. If there is not enough sap flowing, the buds will not take no matter how well the buds are cut and tied in.

The budwood is ready when the prickles snap crisply; the centre buds from a side branch are the best to use. Buds near the base may be poorly developed and those near the tip are usually immature.

Precision and speed or rather a sure touch are important to give a good union of stock and scion. Buds should be inserted on the side sheltered from sun. Tying in should be done neatly with raffia.

As growth of the stock will continue, the raffia ties should be cut within 2 to 3 weeks, or the stems may be constricted and buds injured.

If a bud does not take, a second attempt may be made if there is room on the stock and the bark still lifts freely.

Once the buds have started into growth in the following spring the long top growth of the stock may be cut back and gradually reduced. The final cut, near the bud growth, should not slant so steeply that it cuts the back of the stem behind the union. If that occurs, it is likely to weaken the new growth and in extreme circumstances bring about its death.

The young growth of the bud is very soft and brittle, and is liable to snap or blow out during windy weather. To avoid this it should be tied to a stake.

Seedling peaches, which come readily under peach trees, may be lined out during September-October and grown on until late January-February, when they can be budded with a good variety of peach or they may be budded with flowering almonds or flowering plums. There are many good varieties of prunus and it would be possible to build up quite a collection in this manner.

Photographs by Douglas Elliott, except that on this page and that at left on page 95, which is by National Publicity.

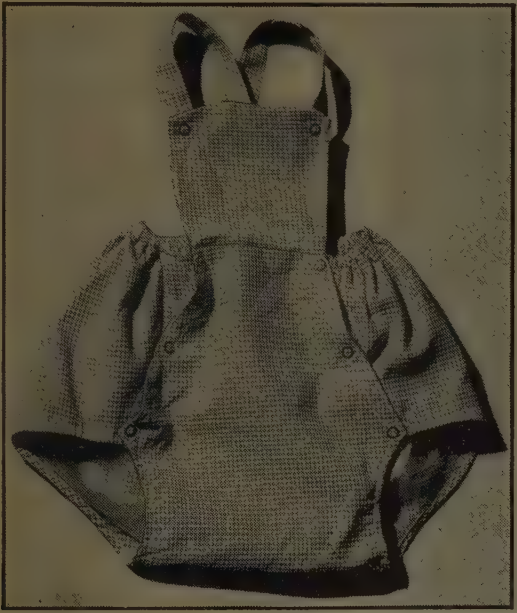
A Short Cut in Silver Cleaning

THERE are several kinds of clear silver-cleaning, chemical solutions on the market which make short work of cleaning egg-tarnished forks or spoons. Silverware is dipped into the liquid and then rinsed in clean water. It is important to rinse the silver at once, as a white cloudiness will develop on the metal if time is allowed to elapse. A final polish with a special cloth completes the cleaning.

These cleaning solutions should not be used for silver with a French grey or oxidised finish, but if the makers' instructions are followed much of the time-consuming labour involved in keeping silver polished may be avoided.

—*BETTY M. JOHNSTON, Field Officer in Rural Sociology, Department of Agriculture, Wellington*

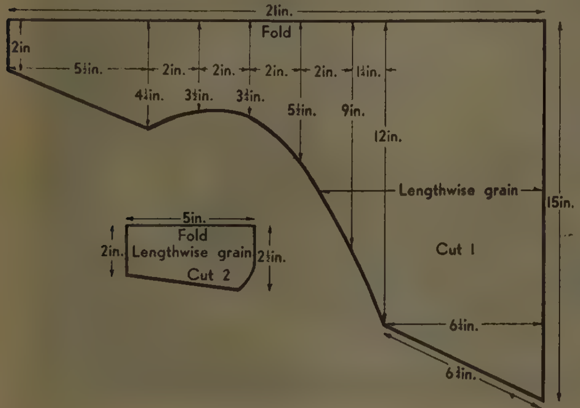
Toddler's Sun Suit



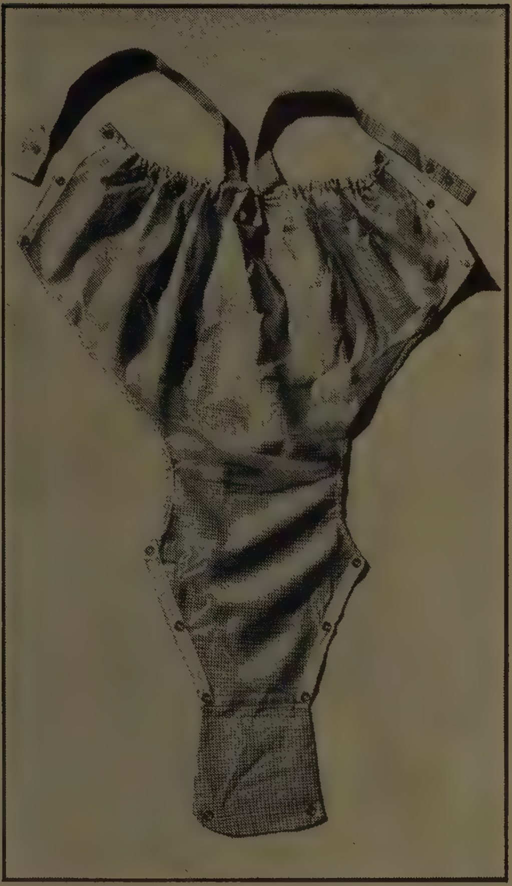
THE hot days of summer should mean a respite from seemingly endless washing for mothers of small children. Thick clothes can be discarded and older children can keep cool and reasonably clean in sun dresses and shorts, but the toddler still in napkins can at times get very wet and grubby. A sun suit partly lined with plastic prevents "black nappies", and the one illustrated looks most attractive on a small child. It is made of fine red and white checked gingham, the lower parts being lined with plastic, and substantial domes, the type found on raincoats, are used instead of buttons.

THE sun suit is very easy to wash, and it should be lightly pressed with a cool iron to avoid damage to the plastic. A fine seersucker would be an excellent material to use with plastic, as there would then be no need for ironing. A matching sun bonnet or hat could be made to complete the outfit.

Materials: 2/3yd. of 36in. gingham, seersucker, or printed cotton; 2/3yd. of ½in.-wide cotton tape; 2/3yd. of good-quality plastic; 10 heavy press studs (domes); a reel of cotton; 12in. to 14in. of good-quality elastic.



Pattern of the sun suit.



The sun suit opened out, showing the plastic lining.

Instructions for Cutting and Sewing

Cutting

Cut a single thickness of the cotton and plastic, two bibs, and two straps.

Marking

Fold and machine stitch the cotton over the plastic lining. Sew strips of tape on the inside to act as a firm backing for the domes. These may be put on in a shop that sells oilskins, camping gear, and raincoats, or heavy domes may be sewn on by hand. The bib is stitched round two sides and the top and attached to the pants. The cotton material is always folded over the plastic, which helps to prevent it pulling away from the stitching.

Thread the elastic through the fold at the back of the pants and attach it firmly at each side. Attach the straps at the centre back, allowing sufficient length for crossing when they are done up. It is a good plan to have two sets of domes put on the straps to allow them to be lengthened as the toddler grows. A firmly stitched pleat where the straps are attached at the back can be undone to give extra length.

Plastic sheeting is usually about 48in. wide, so that 2/3yd. should be sufficient for two sun suits.

—*BETTY M. JOHNSTON, Field Officer in Rural Sociology,*
Department of Agriculture, Wellington

PEPPERS grow well in sheltered places in the garden in warm districts. They are one of the annual varieties of the capsicum family and bear fruits which begin to ripen in February and will usually continue to ripen until the first frosts. In this article by Nell Macpherson, formerly Field Officer in Rural Sociology, Department of Agriculture, Auckland, directions for preparing them and recipes for dishes in which they are the main flavouring ingredient are given. Other ways of using peppers will occur to experienced cooks.

THEY can be used ripe, but are more often used before they ripen and are commonly called green peppers. They can be cooked whole and stuffed or can be used as a flavouring.

Stuffed Peppers

Select well-shaped peppers and wash them carefully. Cut out the stem and scoop out the fibre and seeds. The peppers are then ready for cooking.

Place the peppers in a saucepan of water and simmer them for 10 to 15 minutes until they are tender but not soft. Fill them with one of the following mixtures:—

Mince Stuffing

½lb. of mince
1 small onion
1 small carrot
½ cup of water
1 tablespoon of flour
¼ teaspoon of dried herbs
¼ cup of water
½ teaspoon of salt

Peel and chop the onion and carrot finely and add them to the mince and water. Add the herbs, bring to the boil, and simmer for ¾ to 1 hour. Mix the flour, salt, and ¼ cup of water to a paste. Add this to the mince and cook for 5 to 10 minutes. The mixture should be thick. Pack this mixture into hot cooked peppers and place under the grill to brown on top.

Cheese Stuffing

½lb. of cheese
1 tablespoon of butter
Salt to taste
2 tablespoons of milk
1 teaspoon of cornflour
Pinch of cayenne pepper

Melt the butter in the milk. Grate the cheese and add it to the milk mixture. Add the salt and cayenne pepper. Add the cornflour and mix it in well. Cook the mixture over hot water until it thickens. Fill the hot, cooked peppers with the mixture.

Cheese and Tomato Stuffing

½lb. of cheese
2 medium-sized tomatoes
1 tablespoon of butter
Pinch of mace
Salt to taste
1 teaspoon of cornflour
Pinch of cayenne pepper

Blanch and peel the tomatoes and remove the cores. Melt the butter in a saucepan and add the tomatoes. Mash gently and cook until the tomatoes are pulpy. Add the mace, salt, and cayenne pepper. Grate the cheese, add the cornflour to it, and then add this mixture to the tomato mixture. Cook gently until the mixture thickens. Stuff the hot, cooked peppers with it. Brown under the grill.

Sausage and Apple Stuffing

1 apple
½lb. of sausage meat
1 tablespoon of water

Peel and core the apple and chop it finely or grate it. Cook it in the water, add the sausage meat, and stir thoroughly while cooking for a further 10 minutes. Stuff the hot, cooked peppers with it and serve with tomato sauce.

Tree Tomato Stuffing

1 cup of breadcrumbs
4 tree tomatoes
2 tablespoons of sugar

Blanch and peel the tree tomatoes and slice them. Cook gently in a saucepan. Add the sugar and the breadcrumbs. Pile into hot peppers and serve with a garnish of grated cheese.

Pepper Rings

Fried pepper rings make an attractive garnish for such dishes as grilled steak and they also add a piquant flavour.

2 large well-shaped peppers
1 egg, slightly beaten
2 tablespoons of dried breadcrumbs

Wash the peppers and slice them in ¼in. slices. Cut out the seedy centres. Dip each ring in the egg and then in the breadcrumbs. Fry the rings in shallow fat for 2 minutes. Turn them and fry for a further 2 minutes.

Rice with Peppers

1 cup of rice
2 tablespoons of fat
1 cup of tomato pulp or puree
2 large sliced onions
3 cups of boiling water
1 teaspoon of salt
2 chopped green peppers
1 teaspoon of Worcestershire sauce (can be omitted)

Wash the rice. Melt the fat in a deep frying pan and fry the rice to a golden brown. Add the remaining ingredients and simmer for 30 minutes. (6 servings.)

Corn and Pepper Casserole

[illegible] cups of corn kernels (tinned corn can be used)
¾ cup of soft breadcrumbs
2 tablespoons of butter
1 egg
½ cup of finely chopped green pepper
1 teaspoon of Worcestershire sauce
½ teaspoon of salt
Shake of pepper

Mix all the ingredients together and turn the mixture into a greased casserole. Bake in a moderate oven at 350 degrees for 20 minutes. Garnish with sprigs of parsley. (6 servings.)

Mince with Peppers

1lb. of mince
1 chopped onion
2 tablespoons of chopped swede
3 green peppers
1 chopped carrot
½ teaspoon of salt

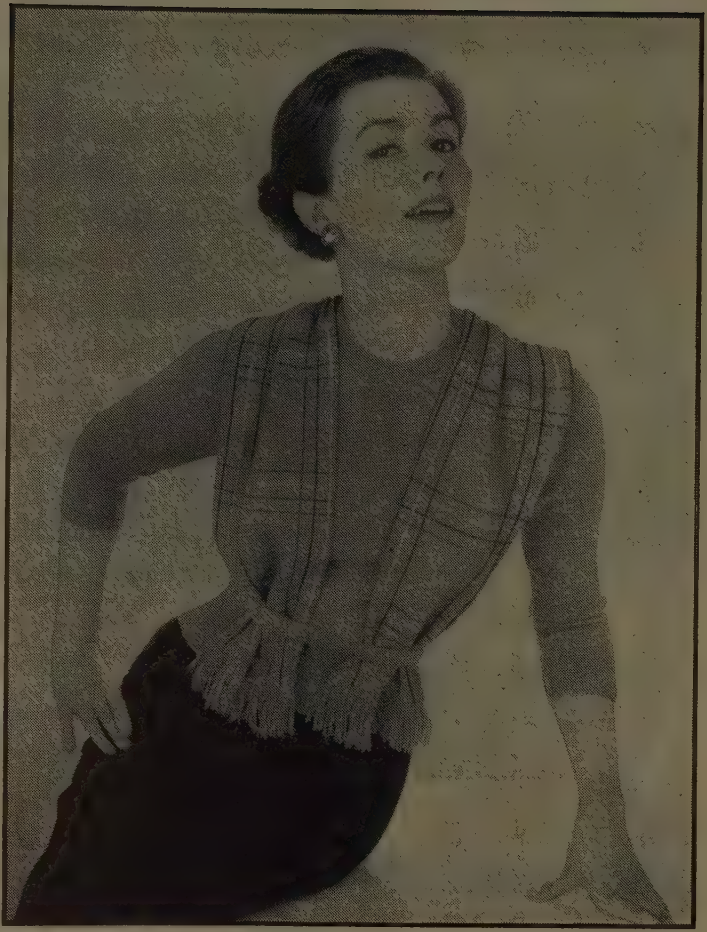
Wash the peppers and cut them in halves. Scoop out the seedy pulp and bring it to the boil in just enough water to cover it. Strain it and cook the mince, onion, carrot, and swede in the liquor for 30 minutes. Chop the flesh of the peppers and add it to the mince. Cook for 15 minutes more. (4 servings.)

Photographs by Sparrow.

Rice with peppers is an unusual and appetising dish.

Unusual Jumper with Scarf to Match

THE jumper with three-quarter length sleeves and attached scarf illustrated on the right is a garment of unusual charm. The basic colour is grey and four other colours are used in vertical and horizontal stripes on the scarf and on the back of the jumper to produce a very original plaid effect.



ABBREVIATIONS: K., knit; p., purl; st., stitch(es); rep., repeat; beg., beginning; dec., decrease; inc., increase; st. st., stocking stitch (1 row k., 1 row p.); g. st., garter stitch (every row knit); cont., continue; sl. st., slip stitch.

Materials: 13oz. 3-ply wool, in grey (G.); small balls of 3-ply wool in red (R.), green (Gr.), yellow (Y.), and royal blue (R.Bl.); 2 No. 16 knitting needles; 6 press fasteners; grey binding for shoulder edges; a crochet hook.

Measurements: Length 20in., to fit a 34in. bust, sleeve seam 13in.

Tension: 10½ st. to 1in.

The Front

Using G. wool cast on 130 st. and work 4in. in k. 1, p. 1 rib. Next row: * K. twice into 1st st., k. 4. Rep. from * to end. (156 st.) Next row: P. to end. Next row: K. 32, cast on 40 st., slip next 36 st. on to a spare needle, k. 20, cast on 40 st., slip next 36 st. on to a spare needle, k. 32. Work in st. st. across all stitches for 9 rows, thus ending with a p. row. Next row: K. 32, cast off 40, k. to last 72 st., cast off 40, k. to end. Leave main stitches for the time being. Using grey wool and with right side of work facing rejoin wool to first set of 36 st. on spare needle and work thus:—

1st row: K. 3 times into 1st st., k. to end, working 3 times into last st. Work 10 rows in st. st. on these 40 st., thus ending with a k. row. Leave stitches on spare needle. Work on second set of stitches in same way. Now return to main stitches with wrong side of work facing and work thus:—

Next row: P. 32, work on st. from spare needle thus: P. 3 tog., p. 34, p. 3 tog., p. 20, work on st. from spare needle thus: P. 3 tog., p. 34, p. 3 tog., p. 32. (156 st.) Cont. in st. st. inc. 1 st. both ends of the 7th row and of every following 8th row until there are 184 st. on needle. Proceed without shaping until work measures 12in., ending p. row.

Shaping armholes: Cast off 8 st. beg. of next 2 rows, then dec. 1 st. both ends of every row until 156 st. remain, then dec. both ends of every alternate row until 142 st. remain. Cont. without shaping until work measures 17in., ending p. row.

Shaping neck: Next row: K. 62 st., k. 2 tog., turn. Cont. on these stitches only, dec. 1 st. at neck edge on every row until 52 st. remain. Cont. without shaping until work measures 20in., ending armhole edge.

Shaping shoulder: Next row: Cast off 13, work to end. Next row: Work to end. Rep. last 2 rows twice. Cast off remaining stitches. Leave centre 14 st. on spare needle, rejoin wool to remaining stitches at neck edge and work as given for first side.

The Back

Work ribbing as for front. Next row: * K. twice into 1st st., k. 4., rep. from * to end, inc. in last st. (157 st.) Work 7 rows in st. st. beg. and ending with a p. row. Next row: With R. k. to end. With G. work 7 rows st. st. Next row: With R.Bl. k. to end. With G. work 7 rows st. st. inc. 1 st. both ends of 4th row. Next row: With Y. k. to end. With G. work 7 rows st. st. inc. 1 st. both ends of 4th row. Next row: With Gr. k. to end. With G. cont. in st. st. for 55 rows beg. and ending with a p. row and inc. 1 st. both ends of 4th row and of every following 8th row.

Now work a second set of 4 stripes in colours as for first set, still inc. 1 st. both ends of every 8th row. When Gr. stripe is completed cont. in st. st. with G. inc. as before on every 8th row until there are 185 st. on needle, then cont. straight until work measures 12in., ending p. row.

Shaping armholes: As for front, dec. until 143 st. remain, then cont. straight until there are 55 rows worked in G. st. st. after last Gr. stripe, ending p. row. Now work a 3rd set of stripes in exactly the same way as for 1st and 2nd sets, then cont. in grey st. st. until work measures 19½in., ending p. row. Next row: Cast off 3 st., cast on 3, k. 15, k. twice into each of next 29 st., k. 2, cast off 3, break wool, turn, leave remaining stitches on spare needle.

The Scarf

Next row: Cast on 3, k. these 3 st., p. to last 3 st., k. 3. (81 st.) Cont. in G. st. st. for 36 rows, ending p. row, keeping 3 st. at each edge in g. st. throughout. Now work another set of stripes as before, then work 55 rows in G. st. st., working the coloured stripes inside the g. st. borders keeping these borders in G. g. st. Cont. in this way until scarf measures 19in. from commencement (that is, inc. row at shoulder), ending p. row. Work 4 rows in G. g. st. across all stitches. Cast off.

Leave centre 39 st. on spare needle for neck band, rejoin G. wool to remaining 52 st. at neck edge and work thus:—

Cast off 3 st., cast on 3 st., k. these 3 st. and next 2 st., k. twice into each of next 29 st., k. 15, cast off 3. Rejoin wool at needle point, cast on 3, k. these 3 st., p. to last 3 st., k. 3.

Cont. in st. st. with 3 st. in g. st.

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at edges as given for first half of scarf, and complete to match.

The Sleeves

Using G. wool cast on 80 st. and work 1in. in k. 1, p. 1 rib. Cont. in st. st. inc. 1 st. both ends of 7th row and of every following 6th row until there are 136 st. on needle. Cont. without shaping until work measures 13in., ending p. row.

Shaping top: Cast off 5 st. beg. of next 2 rows, dec. 1 st. both ends of every row until 90 st. remain, then dec. both ends of every alternate row until 40 st. remain. Cast off 13 st. beg. of next 2 rows. Cast off remaining stitches.

Neck band: Join left shoulder seam by stitching front shoulder edge along wrong side just before the inc. row for scarf. With right side of work facing, using G. wool, work in k. 1, p. 1 rib along 39 st. from spare needle, k. up 58 st. along front neck edge, k. 14 st. from spare needle, k. up 58 st. along neck edge to right shoulder. Work ¾in. in k. 1, p. 1 rib. Cast off loosely in rib.

The Make-up

Press work lightly on wrong side with hot iron and damp cloth. Now using the coloured wools and working in chain st. work the vertical stripes on back thus: Mark the 19 st. at centre back, now on one side of the centre 5 st. work a row of R.Bl. chain st. down the next st. from back of neck edge (below the neck ribbing) to top edge of waist ribbing, taking 1 chain st. per knitted st. Now on the other side of the 5 centre st. work a row of Y. chain st. in the same way. When completed, count 5 st. from Y. chain st. and in the next stitch work a row of Gr. chain st., then on the other side count 5 st. from R.Bl. chain st. and work a row or R. chain st. in the next st. There is now a group of 4 stripes separated by grey panels of 5 st. on the centre 19 st. of back. Now count 37 st. along from the R. stripe and then work another group on the next 19 st.

When completed, count 37 st. on the other side of the centre group from the Gr. stripe and work another group on the next 19 st. thus making 3 groups in all, but cont. these two outer groups of stripes for the whole length of the scarf ends. When these are completed, count along 31 st. from the inside stripe on the scarf and work a second set of stripes on the next 19 st. for scarf only. Work second scarf in same way. Join right shoulder seam at armhole edge for ¼in. Face front shoulder edge on wrong side with the binding, then sew a strip of binding along the shoulder edge of back, just below the inc. row for scarf. Sew press fasteners on to this binding for fastening.

Fold the 3 g. st. on edges of right and left halves of the scarf on to wrong side and sl. st. into position to neaten edges. Turn back about ¼in. at lower edges of each half of the scarf and sl. st. Then complete these edges with a 2in. grey fringe. Sew side edges of fronts along back of slots and slip scarf ends through. Join side and sleeve seams with narrow backstitch seams. Sew sleeves into armholes in same way, matching seams. Press seams.

GUAVAS

By NELL MACPHERSON, formerly Field Officer in Rural Sociology, Department of Agriculture, Auckland

THERE are two varieties of guavas grown in New Zealand, the red-fruited, which is the more common, and the yellow-fruited. The yellow guava is larger than the red guava and has a milder flavour, but they can both be used in the same way. The fruit ripens during March and April and has a rather sharp flavour.

GUAVAS can be made into a number of attractive dishes or can be used as an accompaniment to other dishes. The recipes given here will be found useful by the housewife who wishes to introduce guavas to her family's diet.

Guava Pie

2 cups of guavas
1 cup of sugar
Water

or

1 pint jar of preserved guavas

2 cups of flour
3 teaspoons of baking powder
1 teaspoon of salt
1 tablespoon of sugar
1 tablespoon of custard powder
1 cup of milk
6 tablespoons of fat

Cook the guavas and sugar together in just sufficient water to cover them. Mix the flour, baking powder, salt, sugar, and custard powder and cut in the fat. Mix to a fairly stiff dough with the milk. Line a pie plate with this shortcake mixture and prick the surface. Cook for 5 minutes in a hot oven (500 degrees). Strain the guavas and reserve the juice. Put the strained guavas on the pie and cook a further 10 minutes at 450 degrees. Serve with guava sauce. (6 servings.)

Guava Sauce

1½ cups of guava juice
1 tablespoon of cornflour
1 teaspoon of sugar
1 tablespoon of butter

Mix the cornflour and sugar to a paste with a little of the juice. Heat the remainder of the juice to boiling. Add it to the cold mixture and return it to the heat. Cook for 5 minutes until the sauce thickens. Stir in the butter and serve immediately.

HEADING PHOTOGRAPH: Guavas make a delicious pie, particularly when served with guava sauce, as shown in this illustration. Sparrow photograph.

Guava Pudding

2oz. of suet
1 cup of flour
1 teaspoon of baking powder
1 cup of guavas
Pinch of salt
Milk to mix
½ cup of sugar

Rub the suet into the flour, baking powder, and salt. Add sufficient milk to make a stiff dough. Cut off a quarter of the dough. Roll the remainder out to ¼in. thickness and line a greased pudding basin with it. Put the guavas into this and cover them with the sugar.

Roll out the remaining piece of dough into a circle large enough to fit the top of the basin. Place it over the fruit and pinch the dough together at the edges. Cover the top of the basin with greaseproof paper. Place it in boiling water and cook for 1 to 1½ hours. Turn the pudding out on a plate and serve it with custard sauce or whipped cream. (6 to 8 servings.)

Guava Jelly

2 quart measures of guavas
2 lemons
Water
Sugar

Cut up the guavas and the lemons, put them in a preserving pan, and cover them with water. Simmer for 2 hours, then strain through a jelly bag. Measure the liquid obtained and allow 1 cup of sugar for each cup of juice. Bring the juice to the boil, add the warmed sugar, and stir until it is dissolved. Boil hard until it gives the setting test. Pour into heated jelly jars and allow it to cool. Pour melted wax over the jelly and then cover the jars. Store in a cool, dry, dark cupboard. This is a beautiful red jelly which can be served in the usual way or as a condiment with cold lamb or veal.

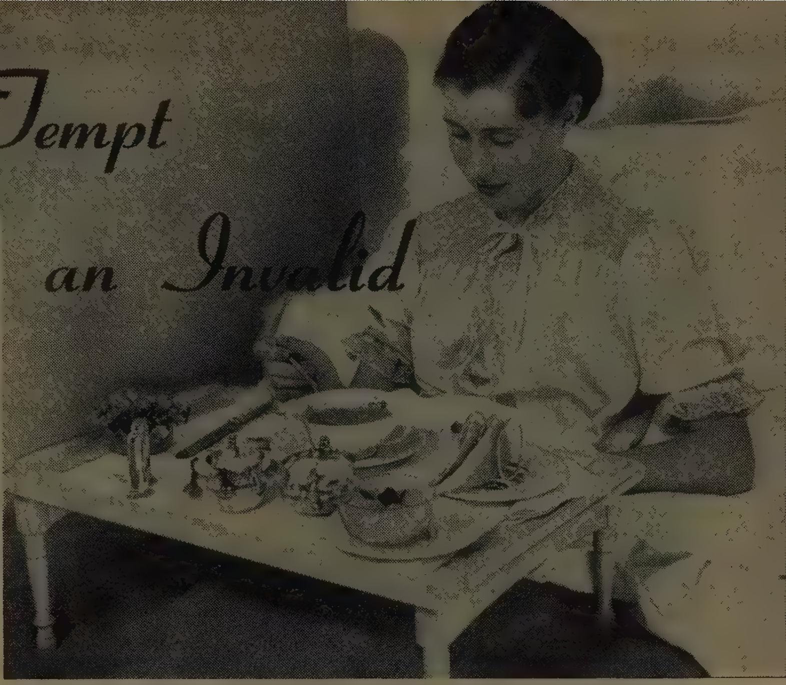
Preserved Guavas

Make a syrup of 1 cup of sugar to 2 cups of water. Wipe the guavas and pack them in jars. Cover them with the hot syrup and adjust the lids according to their type. Process the jars in a boiling water bath for 15 minutes for pint jars and 25 minutes for quart jars. Leave the jars to stand for 24 hours and then test the seals.

Salads

Guavas can be sliced thinly into either fruit or vegetable salads, to which they add an unusual flavour. The petal ends and stalks should be removed before they are used in salads.

Diets to Tempt an Invalid



IN 1859 Florence Nightingale wrote, "If, then, every woman must, at some time or another in her life, become a nurse—take charge of somebody's health—how immense and how valuable it would be if every woman would *think* how to nurse". Home nursing involves a variety of duties which help to hasten recovery and promote the comfort of the patient; among the most important is the service of the right kind of food. The doctor's instructions must always be followed and for some illnesses a special diet will be prescribed. But for many of the ailments which are nursed at home, however, the instructions may be "fluids only", "light diet", or "what the patient fancies", and the nurse or mother must then interpret these. She must think of ways to prepare and serve the food to encourage the patient to eat and to include all the essentials which will offset the weakening effects of the disease. Here Eleanor Couston, Field Officer in Rural Sociology, Department of Agriculture, Christchurch, defines different diets and gives recipes.

TO maintain good nutrition it is important to know the normal requirements for health and to modify them in time of sickness. This is particularly important when the illness is of long duration.

Tissue Building Foods

The first requirement is for foods which will build and repair the tissues of the body. At all times muscle tissue undergoes a breaking down process and this is hastened during fevers and severe infections. The foods which contain the substance necessary for building and repair are milk, meat, fish, eggs, cheese, whole-grain cereals, and legumes. Depending on the diet prescribed, some or all of these should be included. It is a common error to believe that meat soups will provide the same nutrients as meat, as they contain only the flavour of the meat, some vitamins, and a mere trace of tissue building substance. Meat broths will, however, help to stimulate appetite and to supply salt and fluid.

The correctness of the old injunction "feed a cold and starve a fever" has now been disproved. Feed a cold certainly, but feed a fever also. During fevers the breaking down process is rapid and unless ample nourishment for repair is provided, severe wasting and lowering of resistance will occur. If the patient is very ill, the nourishment must be supplied in the fluids.

Vitamins and Mineral Salts

During many illnesses there is an increased requirement for vitamins and mineral salts. These substances, which are essential for the efficient functioning of the body, are present in varying amounts in many kinds of foods, but chiefly in milk, eggs, cheese, liver, fresh fruits and vegetables, whole-grain cereals, fish liver oil, and yeast extracts. To include the necessary amount in a fluid diet milk drinks, fruit beverages, and broths supplemented with yeast extracts are given. The value of lemon, orange, and black currant drinks has long been recognised, but it was not always known that their beneficial effects for colds and fevers and for healing wounds depended on their vitamin content.

Energy Producing Foods

The requirement for energy producing foods will vary according to the illness. During a long convalescence from an illness which is not accompanied by a rise in temperature the need for energy producing foods such as sugars, cereals, and fats will be reduced, as it is desirable to keep the patient's weight normal; but where there is a fever, the requirements will be increased and gruels, fine grain cereals, and sweetened fruit drinks are given. Glucose and lactose are less sweet than cane suger; therefore more can be added to drinks without making them unpalatable. Butter and cream are the most easily digested fats and can be used to increase the energy value of a diet, but not in too great quantity, since these foods are not of the first importance.

Fluids Are Important

Fluids lost from the body must be replaced or the patient will become dehydrated. Under certain conditions fluids are restricted, but generally fluids are allowed liberally. Large quantities of fluid are lost during vomiting and diarrhoea and through the skin in fevers. If this fluid is not replaced, the condition of the patient will deteriorate rapidly. Salt tends to hold fluid in the tissues and for this reason broths are of value. It should be remembered, however, that clear broths and beef tea do not contain tissue building substances or energy value, and therefore their usefulness is restricted to providing fluid and stimulating appetite.

Various Diets

Fluid Diet

When a fluid diet is prescribed it may contain broths, fruit drinks, barley water, milk beverages, egg flips, cream soups, strained gruels, jellies, and ice cream. Dry ginger ale is sometimes well tolerated, but must be regarded merely as a fluid with a certain amount of energy value. It is lacking in tissue building substances, minerals, and vitamins.

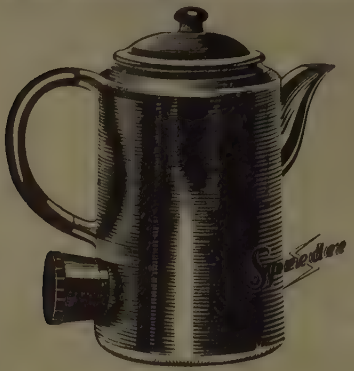
Milk is of particular value, but is sometimes poorly tolerated. It may be flavoured to provide variety and sometimes the addition of soda water will make it more acceptable. A drink which provides many valuable food elements can be made with skimmed milk powder.

Children will often be tempted with drinks flavoured with chocolate and for a special treat can be given home-made milk shakes. A straw will also encourage children to drink.

Fluids should be varied as much as possible to maintain interest. Fruit drinks should be freshly prepared and no drink should be left indefinitely by the bedside. Citrus fruits, tomato juice, and black currant drinks provide valuable vitamin C, and other fruit juices can be given for variety. Cream soups are more nourishing than clear broths because they contain milk and are supplemented with valuable additions such as tomato or vegetable puree.

Semi-solid Diet

Added to the fluid diet list will be eggs, custards, junkets, cereal and



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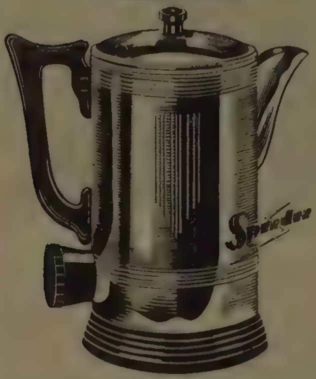

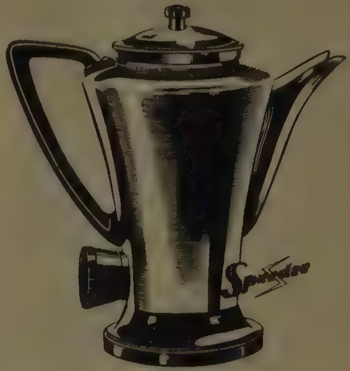

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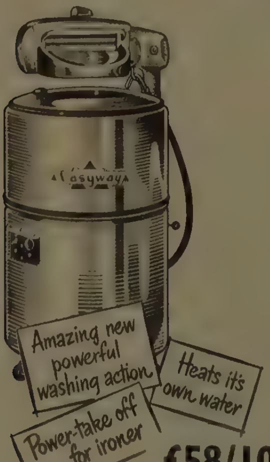
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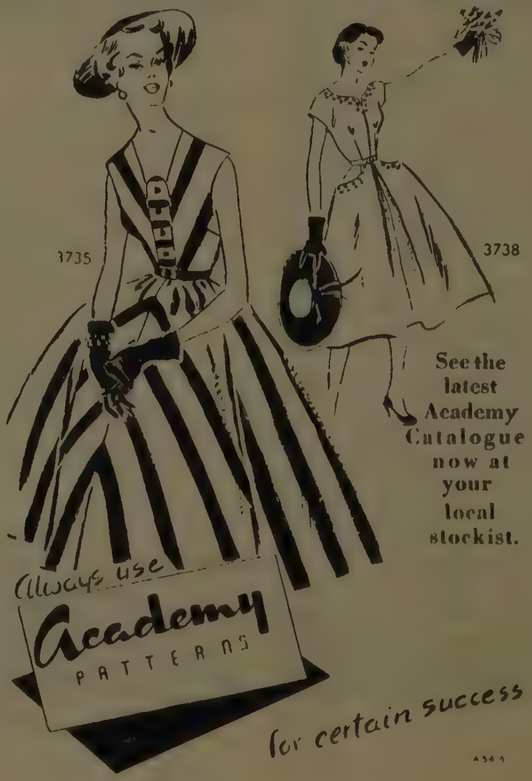
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Milk can be served attractively in drinks, cream soups, desserts, and sauces. The nutritious dishes shown here are: Left row, from back—Soft custard, milk shake, arrowroot souffle. Centre back—Milk jelly. Centre front—Steamed fish with egg sauce. Right row, from back—Cream soup, caramel custard, fluffy cocoa.

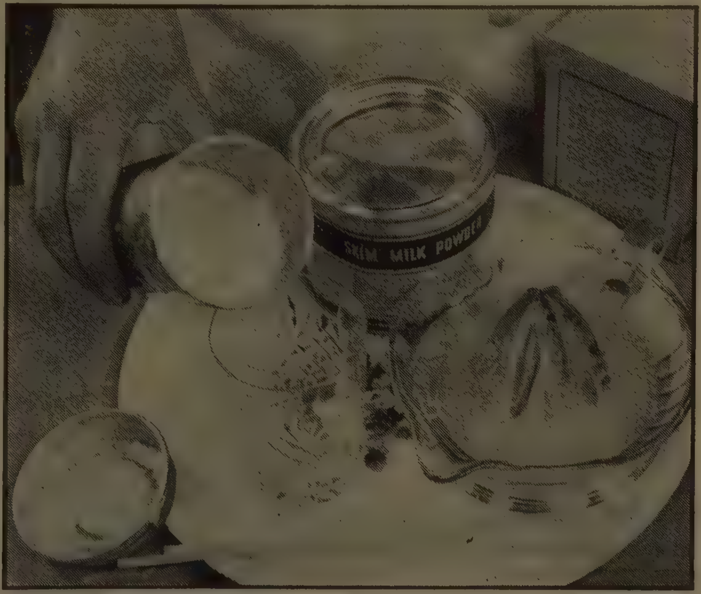
gelatine desserts, and cheese dishes such as cheese custard or souffle. Thin bread and butter and fruit or vegetable puree will also be included. When the patient is suffering from a painful throat condition, frequently semi-solids such as ice cream, junket, and jelly are more easily swallowed than fluids.

Low-residue Diet

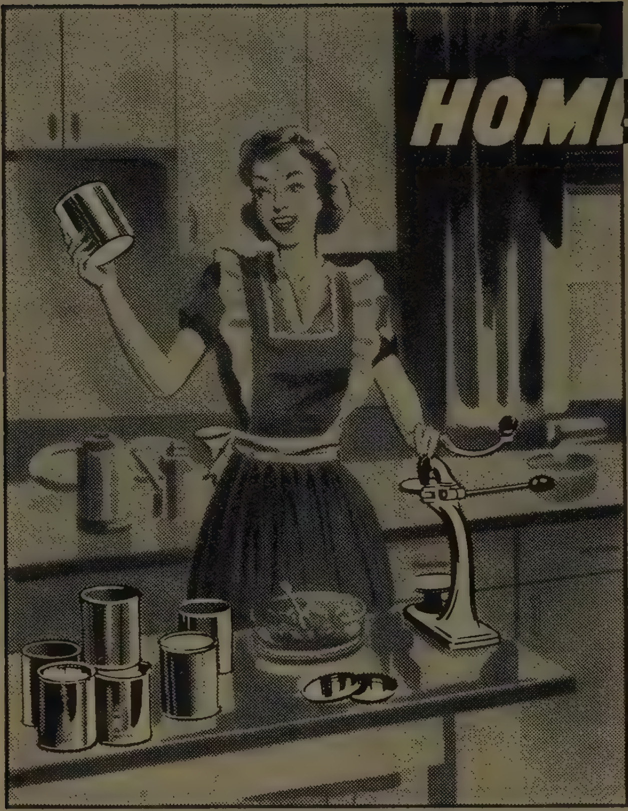
The foods which contain residue or roughage are whole-grain cereals, fruits, and vegetables. Therefore to modify a diet to one which is low in residue these particular foods are strained or sieved. In other respects the diet is similar to a light diet. Care must be taken to see that no foods containing nuts, seeds, or pips are given. Fruit juices and yeast preparations should be included in a low-residue diet to compensate for the lack of fresh fruit and whole-grain cereals.

Light Diet

A light diet will include all kinds of beverages, cereals, fruit, easily digested vegetables, eggs, and cheese. It will also contain fish and meat, but when a patient is first allowed a light diet it is wise to make the change gradually, first including fish, chicken, brains, sweetbreads, or rabbit, then working up to other varieties of meat. Desserts can be more varied too, but all fried foods, pastry, and heavy desserts should be avoided. So also should rich meats such as pork, highly



A milk shake with valuable food elements is made from skimmed milk powder, orange juice, and glucose.



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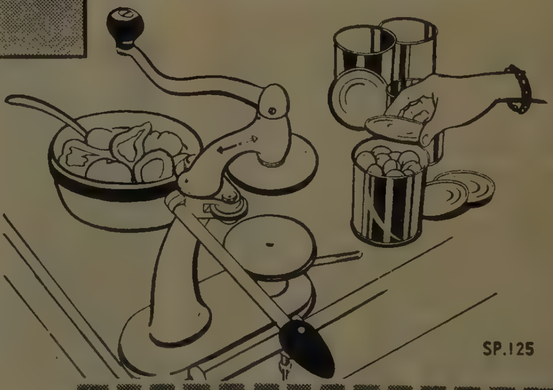

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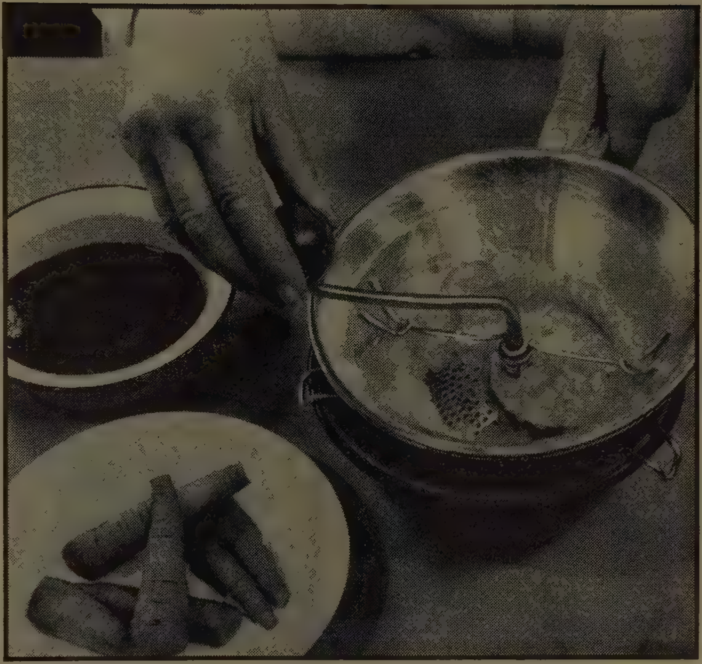
seasoned food, and vegetables which may cause flatulence such as onions or cabbage.

Patient's Fancies

When convalescent the patient is generally allowed a full diet. Impaired digestion, constipation, and lack of appetite may accompany convalescence and food should be chosen which will counteract these. Milk, eggs, and cheese are not in themselves constipating as is sometimes thought, but a diet which excludes fruit and vegetables may lead to constipation.

Sick people frequently develop a dislike for sweet foods and something with a sharp or savoury flavour may hold more appeal. Grapefruit in the morning will often make a good start for the day. It freshens the mouth and provides a certain tang which may lead to improved appetite. After a long period on soft foods something to chew such as crisp toast melba or a grilled lamb chop will be appreciated. When the appetite is capricious foods with a distinctive flavour such as asparagus, oysters, or tomatoes may prove a successful choice.

If the patient expresses a fancy for a certain food, the nurse should try to meet her wishes, but a sick person will generally prefer to have the thinking done for her. It is always encouraging when the patient expresses pleasure over her meal, but this should not lead to over-frequent service of one particular food, as the most favourite food will pall unless there is an interval between its appearances.



A food mill simplifies the task of sieving cooked fruit and vegetables.

Dietary Care of Older People

Even when there are no clinical complications certain problems may arise concerning the food which old people require to keep them in good health and to maintain resistance to disease. Many old people develop food prejudices because perhaps on a certain day one particular food was thought to cause a digestive upset or because their teeth or dentures are in poor condition and they find food difficult to masticate, or merely because their likes and dislikes have become more marked. There is a tendency to avoid meat because of a false idea that it will raise the blood pressure or damage the kidneys. Another common fallacy is that fruits and tomatoes will form acid and lead to rheumatic complaints. These foods are actually converted by the body into alkaline substances, the one exception being rhubarb, which does contain a proportion of free oxalic acid, which some people cannot deal with. Some dietaries become so restricted as to consist almost entirely of bread and butter and cups of tea. There is no special diet for the old, but the great objective is to keep them interested in a wide variety of foods and to serve these in such a way that they can masticate and digest them easily.

Orange segments are quickly prepared and easily eaten.

The nutritional requirements of old people are in many ways similar to those of young persons, but because their activity is less and their rate of digestion slower, their need for energy foods is decreased. There is still need for those foods which build and repair body tissue and also for the foods rich in minerals and vitamins which will prevent the decalcification of bones and keep other body processes functioning normally. Fats and sweet

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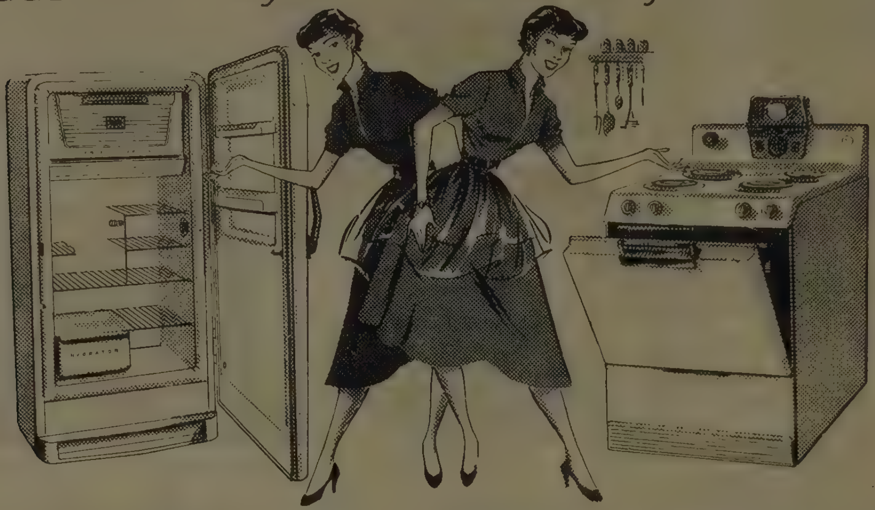

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Through a New Zealand-wide Network of Authorised Dealers or starchy foods are frequently eaten in too large quantities, to the exclusion of the foods necessary for health protection and leading to overweight. Simple rules for feeding old people can be summarised as follows:—

Serve balanced meals, giving consideration to appetite and activity. Restrict the quantity of starchy and rich, fatty foods. Keep the milk intake as near 1 pint per day as possible, including it in beverages, desserts, soups and sauces, bread and milk, and arrowroot.

Give moderate servings of meat, liver, fish, poultry, eggs, or cheese every day.

Include potatoes and vegetables daily, but avoid onions, cabbage, and turnips if the digestion is impaired.

Serve fruit or fruit juices daily, especially citrus fruits, tomatoes, tree tomatoes, and Chinese gooseberries.

Butter and cream are the most easily digested fats and can be given as desired, provided there is no tendency to overweight. Fried foods are difficult to digest, so should be avoided.

Whole-grain cereals and bread can be given in reasonable amounts.

Salt and other condiments may be used in moderation to make food palatable.

Sugar, honey, jam, scones, cakes, and similar foods may be included, but should not replace the more important foods listed above.

Tray Service

When a person is ill food takes on a special significance. It may be anticipated with pleasure and as a relief from boredom or it may be regarded as a painful necessity. Eating or even drinking can be a tremendous effort, so food should be served in a form in which it is easily handled. For instance, if an orange is being given, it is much more acceptable if it is served in sections or as juice than if placed whole on a plate for the patient to deal with. Fish is more easily managed if it is filleted and meat should be tender and the knife sharp.

Attractive service is very important and if the food appeals to the eye, it will also appeal to the palate. The tray should be set with fresh linen and the china and glassware varied. The colour, texture, and flavour of the food should be varied too, and suitable garnishes added to enhance its appearance. Hot foods should be served hot and cold foods either iced or served as cold as possible.

Nothing will detract more readily from food than the serving of large quantities. A little, daintily served and all eaten, is of far greater value than a large serving which is merely toyed with.

Recipes

Note: Standard (8oz.) measuring cups and measuring spoons are used in these recipes. All measurements are level.

Beef Tea (3 Servings)

1lb. of steak (topside, thick flank, blade, or chuck)
1 teaspoon of salt
3 cups of water

To obtain the greatest extraction from the meat prepare beef tea in the following way:—

Remove the fat and scrape the steak with a spoon. Soak the scraped beef for an hour in 2 cups of water to which the salt has been added. Strain this and keep the liquid. Place the meat in a small saucepan with the remaining cup of water and boil for 15 minutes. Strain. Combine the two liquids and heat until the colour of the liquid changes from red to brown. Remove any fat, season, and serve.

Cream of Tomato Soup (2 Servings)

1 cup of tomato puree
1 tablespoon of butter
2 tablespoons of flour
1 teaspoon of salt
1 cup of milk

If tomato soup is made in the following way, it will not curdle.

Strain the puree and if it is very thick, dilute with water. Melt the butter, add the flour and salt, and mix thoroughly. Cook 1 minute. Add the tomato puree gradually and bring to the boil. Boil for 2 to 3 minutes. Add the tomato sauce slowly to the cold milk and blend. Heat and serve.

Milk Shake of Skimmed Milk Powder

¼ cup of skimmed milk powder
1 cup of water
Few grains of salt
2 teaspoons of glucose or 1 teaspoon of sugar
Flavouring

Put the water, sugar, salt, and flavouring in a shaker or a glass jar. Sprinkle in the skimmed milk powder and shake. Serve cold.

Alternative milk shakes can be made by:—

Omitting the flavouring and ¼ cup of water and adding juice of 1 orange.

Omitting the sugar and flavouring and adding 1 to 2 tablespoons of chocolate syrup.

Egg Nog (Hot or Cold)

1 egg
1 to 2 teaspoons of sugar
1 cup of milk
Salt, a few grains
¼ teaspoon of vanilla or 2 tablespoons of sherry
Nutmeg

Beat the egg yolk with the salt and sugar. Add the milk (hot or cold) and the flavouring. Strain. Beat the egg white until light and fold into the mixture. Sprinkle the top with nutmeg.

Daintily served food will tempt the capricious appetite.

Fluffy Cocoa

1 to 2 teaspoons of cocoa
1 teaspoon of sugar
Pinch of salt
¼ cup of water
¾ cup of milk
Few drops of vanilla
1 marshmallow

Mix the cocoa, sugar, and salt with the water. Cook these together until thick. Add the milk and heat almost to boiling point. Add the vanilla and the marshmallow and beat with rotary beater.

Ginger Milk (Hot or Cold)

1 cup of milk
¼ teaspoon of ground ginger
1 tablespoon of honey or golden syrup

Mix the honey and ginger and add the milk (hot or cold). Whisk with the beater and serve.

Barley Water

2 tablespoons of barley
1 pint of water
Sugar to taste
Few grains of salt
Piece of thinly peeled lemon rind
Juice of ½ lemon

Wash the barley, put it into a saucepan with water to cover, bring to the boil, strain, and rinse. Return barley to the saucepan, add the salt, lemon rind, and water and simmer for 1½ to 2 hours. Add more water if necessary. Strain and add lemon juice. Sweeten to taste. Serve hot or cold.

Lemon Drink

1 lemon
½ pint of boiling water
2oz. of sugar or glucose

Wash the lemon and peel the rind very thinly. Put the rind and sugar in a jug and pour on the boiling water. Stir until the sugar has dissolved. When cool add the lemon juice and strain and serve.

Apple Snow and Custard Sauce (4 Servings)

1lb. of apples
2 tablespoons of water
2 egg whites
1 teaspoon of lemon juice
2 tablespoons of sugar

Simmer the apples with the water and a thin strip of lemon rind. When soft rub through a sieve and add the sugar and lemon juice. Beat the egg whites until stiff, then fold in the cooled apple pulp.

Serve with custard sauce made with the 2 egg yolks, 1 cup of milk, a pinch of salt, and 1 dessertspoon of sugar.

Grapefruit Mint Jelly (4 Servings)

1½ tablespoons of gelatine
½ cup of cold water
½ cup of sugar
Juice of 1 lemon
1 cup of grapefruit juice
A few sprigs of chopped mint

Soften the gelatine in cold water and stir until dissolved over hot water. Add the sugar and stir until dissolved. Add the mint. Remove from the heat and add the lemon and grapefruit juice. Set in jelly moulds. (Reduce the quantity of sugar if sweetened tinned grapefruit is used.)

Arrowroot Souffle (2 Servings)

½ pint of milk
½oz. (2 dessertspoons) of arrowroot
1 egg
½oz. of sugar
Flavouring or jam

Mix the arrowroot to a smooth paste with a little of the milk. Heat the remainder of the milk and blend with the arrowroot. Return to the pan and cook until thick. Add the sugar and flavouring and stir until sugar is dissolved. Remove from the heat and add the egg yolk. Beat the egg white until stiff and fold into the mixture. Pour into a greased dish and bake in a moderate oven (350 degrees F.) for 15 to 20 minutes. The flavouring can be omitted and the dish lined with jam.

The same recipe can be made with 1½oz. of semolina to replace the arrowroot.

Caramel Custard (3 Servings)

2 eggs
2½oz. of sugar
1 cup of milk
¼ teaspoon of vanilla

Caramelise 2oz. of the sugar and line a baking dish or moulds with the caramel. Beat the eggs slightly, add the remaining ½oz. of sugar and the heated milk. Add the vanilla. Pour into the moulds and bake in a pan of hot water in a moderate oven (350 degrees F.) for 45 to 60 minutes or until firm when tested with the point of a knife. Run a knife round the edge of the moulds and turn out.

Toast Melba

Cut a slice of bread as for ordinary toast about ¼in. thick, remove the crusts, and toast the bread on both sides. Split the toast through the middle and toast the uncooked surfaces.

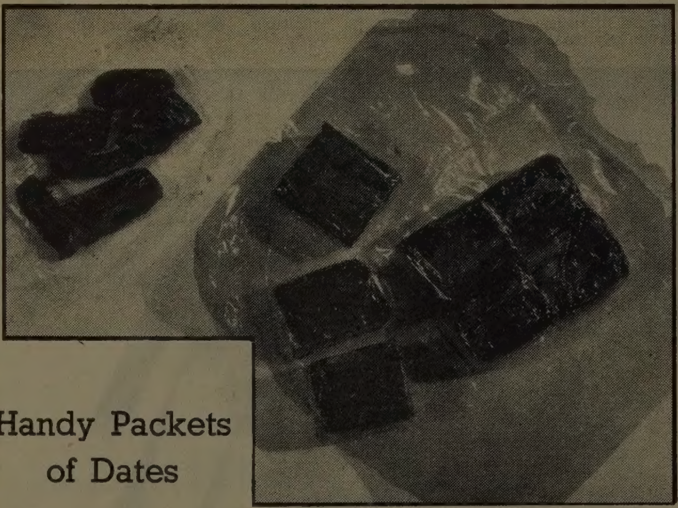
Lamb's Fry

Liver is a very nutritious food and is particularly valuable as a source of iron, protein, and vitamins. To tempt the invalid prepare it this way:—

Remove the skin and slice the lamb's fry obliquely in very thin slices. Dip the slices in seasoned flour to which some chopped parsley has been added (or shake in a paper bag). Fry for 2 minutes on each side in a little bacon fat or butter. Drain and serve with gravy and crisp bacon.

Orange or Grapefruit Sections

With a serrated knife cut the skin and pith from the fruit. Cut between each segment, removing the flesh in neat sections.



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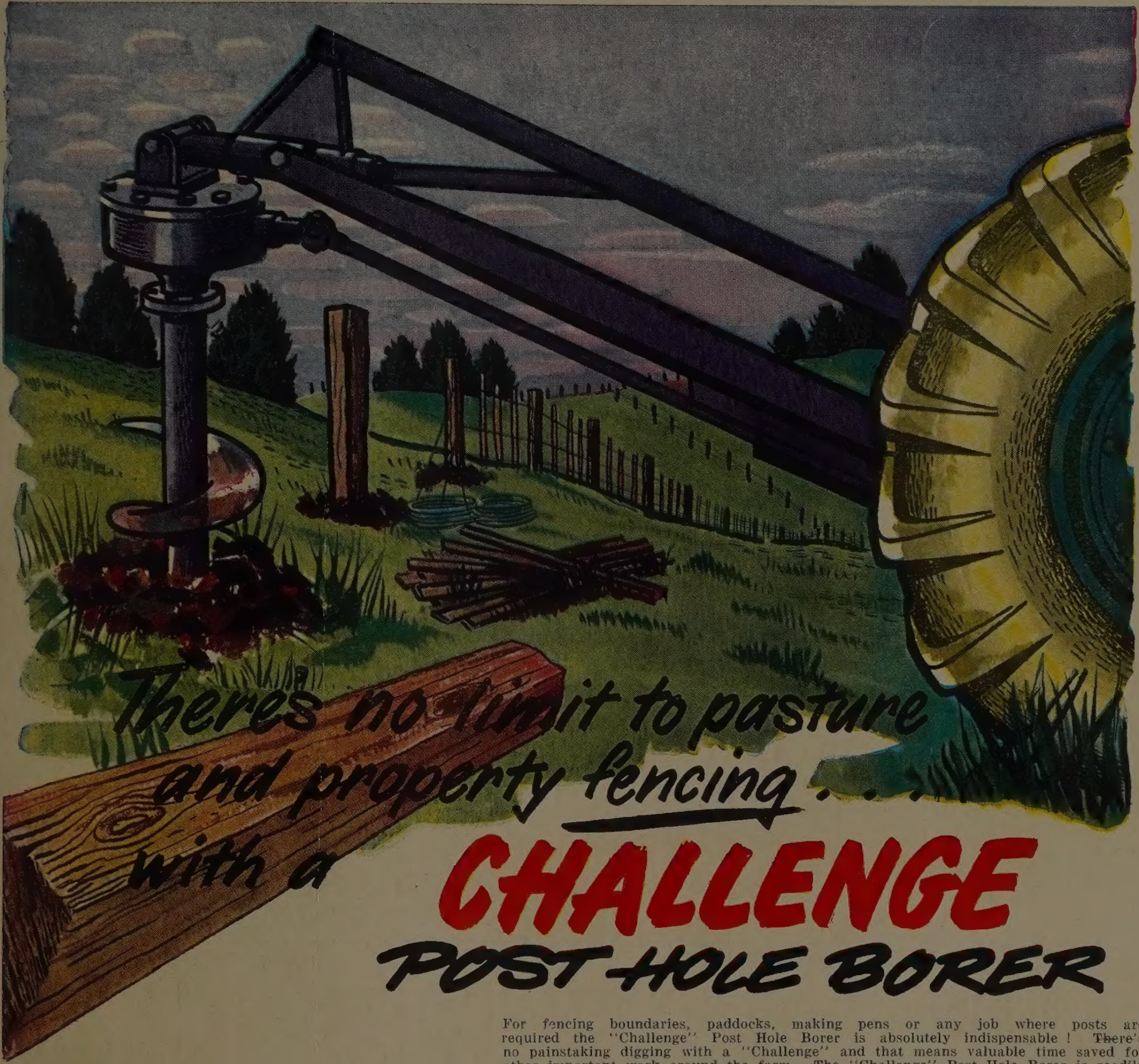

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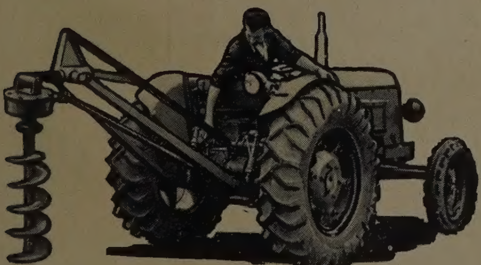

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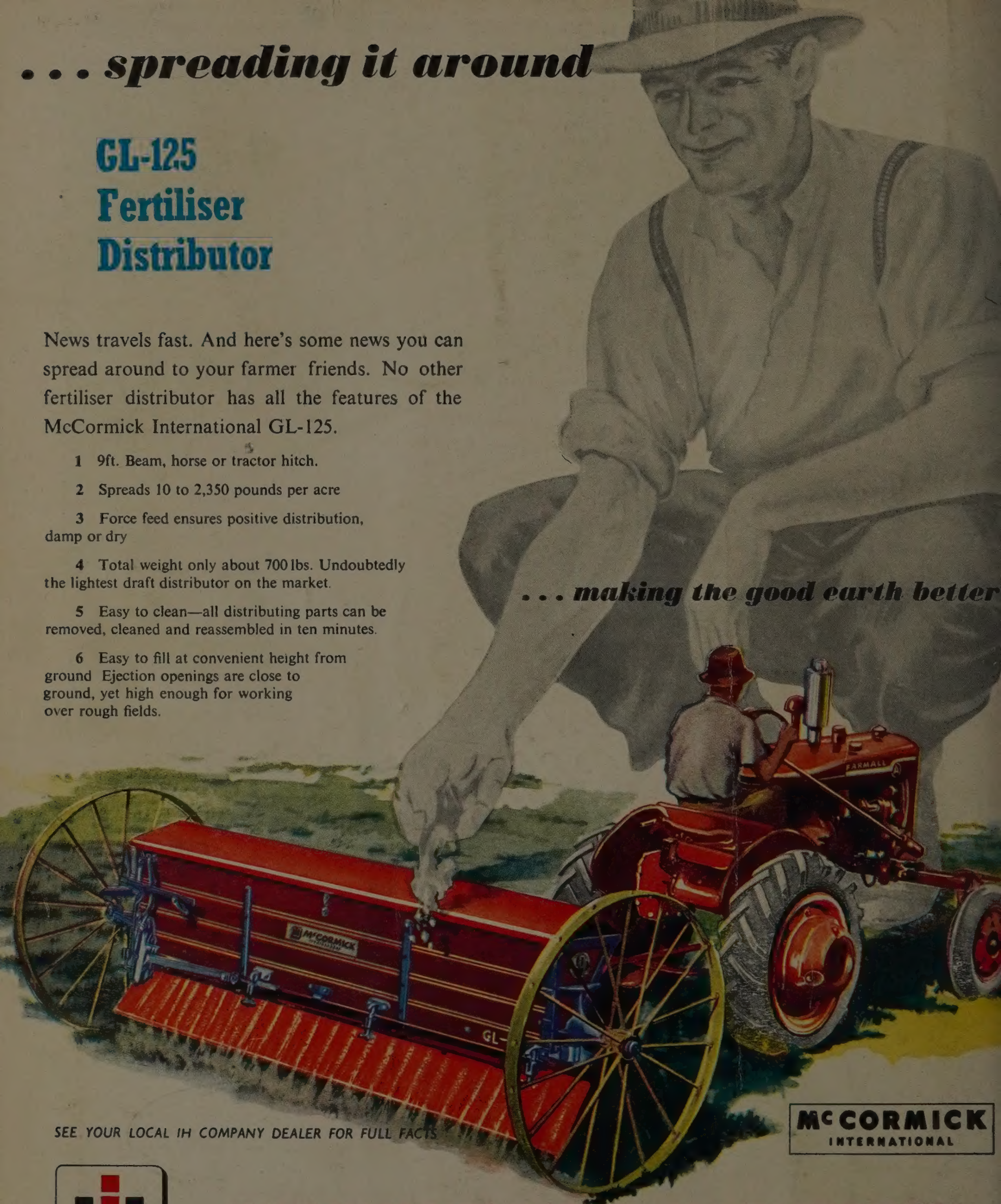
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